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The Changing Political Environment for Tobacco—Implications for Southern Tobacco Farmers, Rural Economies, Taxpayers, and Consumers

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ABSTRACT

The farm level economic implications of the political turmoil surrounding tobacco are examined. Tobacco ranks first in crop receipts in the Southeastern United States. Free market advocates typically want to eliminate the tobacco program because of its cartel-like nature. Health advocates want to maintain the program because it limits tobacco production. Cigarette manufacturers tolerate the program because of the political support they receive from program stakeholders. The effects of cigarette price increases with and without a program are examined. Whether or not the program is maintained in the face of declining tobacco demand has significant implications for Southern agriculture.

Key Words: cigarette price, health advocates, political, Southern agriculture, tobacco, tobacco program.

Since the early settlers discovered tobacco being grown by native North Americans, tobacco has been an important commodity in the south. But it also been a very controversial one. The tobacco debate has intensified during the 1990s. Existing and proposed regulations and restrictions, excise tax increases, health issues, changing social attitudes towards tobacco use, litigation, and international competition have induced much uncertainty regarding the future of the tobacco program, tobacco farming, and many southern rural economies. All of these issues

were intensified and highlighted during last year's lengthy debate over a national tobacco settlement. The debate prompted visits to tobacco-producing states by President Clinton and Secretary of Agriculture Glickman and consumed an unprecedented three and a half weeks of debate on the U.S. Senate floor. Although national tobacco settlement legislation never materialized in 1998, the tobacco companies and the states' attorneys general were successful in developing an agreement to settle existing state Medicaid lawsuits in exchange for tobacco industry agreement to change some of their marketing practices and payments in excess of \$200 billion over 25 years. While the growers were not part of the settlement, the following statement was included in the agreement:

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Whereas, the participating manufacturers recognize the concern of the tobacco grower

Figure 1. Distribution of agricultural receipts¹ in seven² Southern states, 1992–97

community that it may be adversely affected by the potential reduction in tobacco consumption resulting from this settlement, (the manufacturers) reaffirm their commitment to work cooperatively to address concerns about the potential adverse economic impact on such community.

Since the agreement, political leaders from tobacco producing states and tobacco company officials have been meeting to discuss such concerns, termed “Phase II” of the settlement. To date, Phase II involves establishment of a company-supported farm-level trust fund to compensate tobacco farmers for reductions in quota and economic harm induced by Phase I of the settlement.

Despite recent developments, the tobacco industry, tobacco farmers, and communities dependent on tobacco still face considerable political, legal, and economic uncertainty. Flue-cured quotas will be reduced 17.5% in 1999 (to the lowest level in history) and burley quotas are expected to fall by a double-digit level as well. Potential future changes in national tobacco policy (e.g., elimination of the federal tobacco program, increase in the federal excise tax on tobacco products, additional regulation) and litigation facing the industry will continue to affect the structure and location of tobacco farming, diversification strategies, and the distribution of farm income, agribusiness sales, and economic growth in tobacco-dependent regions. Consequently, tobacco farm organizations and policy makers from tobacco-producing states are continually monitoring the political environment to determine the optimal strategy for tobacco farmers

Figure 2. Tobacco receipts as a percent of crop and total agricultural receipts by state, 1992–97

and their rural communities amidst a very uncertain and volatile tobacco outlook. The purpose of this paper is to present the economic fundamentals associated with domestic tobacco production and the U.S. tobacco program and to discuss the implications of potential changes in U.S. tobacco policy at the farm and community level.

Tobacco's Economic Importance to the South

Tobacco is the nation's sixth largest crop in terms of cash receipts and is produced in 20 states. While not considered a major U.S. crop—accounting for about two percent of U.S. agricultural cash receipts in 1997—tobacco is an integral crop in parts of the south. About 90 percent of the nation's tobacco is grown in seven states in the South, led by North Carolina and Kentucky, followed by South Carolina, Tennessee, Virginia, Georgia, and Florida. Within the seven major tobacco producing states in the Southern region, tobacco ranked first in terms of total crop cash receipts and second in terms of overall agricultural cash receipts during the 1992–1996 period (Figures 1 and 2). The relative importance of tobacco in the South is even more pronounced when net returns from tobacco are examined as a share of net farm income. Furthermore, tobacco has trailed only cotton as

the South's most important export commodity (Marchant and Ballenger).

According to the 1992 Census of Agriculture, tobacco is grown on 124,000 farms, with average tobacco acreage of 6.7 acres per farm (Grise). While some consolidation of tobacco production is occurring, production in many parts of the South remains concentrated on relatively small family farms. Average tobacco acreage per farm varies tremendously by tobacco type. Today, most flue-cured tobacco farms (located primarily in the Carolinas, Virginia, Georgia, and Florida) average around 35 to 40 acres of tobacco, compared to burley tobacco farms (located primarily in Kentucky, Tennessee, and North Carolina) which generally produce 10 acres of tobacco or less.

Given the uncertainty facing the tobacco industry, most tobacco farmers are attempting to diversify their income base. However, few alternative agricultural enterprises can consistently rival the \$1000 (plus) net return per acre of tobacco. In many cases, net returns from tobacco are used to finance diversification into other agricultural enterprises. Despite these diversification strategies, a large percentage of farms growing tobacco are still heavily dependent on returns from tobacco. Census data reveal that 73 percent of tobacco farms derive at least 50 percent of their total farm sales from tobacco. While tobacco remains a vital component of the enterprise mix on these farms, census data also reveal that over 60 percent of tobacco farm operators work off farm with over 40 percent working off farm full time (Grise).

Although tobacco is an important component of agriculture in many parts of the South, an expanding non-agricultural economy has diminished tobacco's (and thus agriculture's) relative importance in many areas. A recent USDA study revealed that real personal income in tobacco-producing counties has more than doubled since 1970, while tobacco sales have declined by about 50 percent. Furthermore, the study discovered that tobacco sales account for less than one percent of total local personal income in nearly one half of tobacco-producing counties. In only 20 percent of the more than 400 tobacco-producing counties

does tobacco directly account for more than five percent of local personal income (Gale, USDA). The more "tobacco-dependent" counties are located in regions which possess limited off-farm employment opportunities, low educational attainment levels, and possess personal income growth well below the national average, primarily Kentucky and Appalachian counties. Thus additional income-generating opportunities and educational achievements are very important to the long-term growth of these economies. In the short-term, a significant down-turn in tobacco sales will certainly have noticeable adverse effects on many of these "tobacco-dependent" local economies. Furthermore, given their cost structure, many of these tobacco-dependent counties are very dependent on the continuation of the federal tobacco program.

The U.S. Tobacco Program

The structure of tobacco farming has been influenced considerably by the federal tobacco program. The tobacco program, along with supply restriction programs for many other agricultural commodities (most of which no longer exist), was established under the Agricultural Adjustment Act of 1938 as a means to raise and stabilize tobacco prices and income. Under the program, tobacco farmers agreed to restrict supply via marketing/acreage allotments (or quotas) in exchange for minimum price guarantees. If tobacco companies do not bid above the predetermined price support level at regulated tobacco auctions, grower co-operatives purchase the surplus tobacco using Commodity Credit Corporation (CCC) funds. Price support levels are determined by a weighted average of changes in production costs and lagged market prices. National marketing quotas are set each year based upon the domestic purchase intentions, exports, and CCC loan stock levels. The inclusion of production costs and the fact that downward movement in market prices is limited by the price support structure means that price supports are not very responsive when demand decreases. Thus, it is reasonable to describe the tobacco program as maintaining price by

shifting supply via the marketing quota. Allowing price to fall instead of quota can only be accomplished by lowering price supports through legislative action.

The marketing quotas for U.S. tobacco were initially divided among tobacco growers based on production history. Over the years available quota has been dispersed among heirs of tobacco farmers, non-producers who purchased farms with tobacco quota, and, of course, active tobacco farmers who inherited or purchased quota. The quota can be rented or sold under certain restrictions (Rucker, Thurman, and Sumner). Only individuals owning or renting quota can legally sell tobacco through regulated auctions. Flue-cured tobacco growers own about one-third of the national flue-cured marketing quota (USDA-ERS); the remainder is owned by non-producers who rent their quota to growers. While no hard evidence exists, burley tobacco growers are purported to own about 60 percent of the burley marketing quota.

In economic terms the demand curve for U.S. tobacco is downward sloping and U.S. tobacco producers exercise monopoly power in the world tobacco market through the setting and enforcement of national quotas for U.S. tobacco sales. The downward sloping demand curve for tobacco is well documented (Rezitis, Brown, and Foster; Beghin and Chang; Sumner and Alston). The elevation of U.S. tobacco prices through enforcement of national supply restrictions grants cartel rents to U.S. tobacco quota owners via the marketing quotas. Since a farmer must own or rent quota in order to legally sell tobacco, quota is an asset with its own rental and sales market. The annual rental value of the quota is the annual cartel rent accruing from the tobacco program (Johnson, Johnson and Norton). Figure 3 illustrates the supply and demand for U.S. tobacco at the farm level, as well as the annual marketing quota and the economic rents accruing to quota owners. In Figure 3, P is the market price for tobacco, MC is the marginal cost of production for tobacco, and Q^0 is the national marketing quota level. The rental value per unit of quota, R , is a residual value

Figure 3. Supply, demand, quota, and quota rental rates under the tobacco program

and is determined by the difference between expected price and marginal cost.

From the 1930s to 1980, the program underwent relatively few modifications. However, since the early 1980s, political and economic pressures have induced several program changes and have threatened the program's overall existence. In 1982, the price support program was mandated to operate at no net cost to the federal government or taxpayers. Costs that arise when tobacco put under loan (tobacco taken in by the coops) is later sold at a price lower than the loan principal plus interest are paid by an assessment on growers and buyers at the wholesale level. More recently, legislation has prohibited any federal expenditures on tobacco export promotion or any research related to tobacco production, processing or marketing. Increasing international competition induced price support reductions in 1985 and major trade policy changes in the 1990s. The program was also modified several times in the 1980s and 1990s to allow for a more efficient transfer of marketing quotas, primarily within county boundaries.

Pressures For and Against the Federal Tobacco Program

In general, once government programs have been institutionalized, they are slow to recede

and seldom disappear. Despite this historically accepted axiom of agricultural policy, the 1990s have witnessed a reversal of many long-standing agricultural intervention policies, programs, and instruments. Despite the political climate, several characteristics of the tobacco program have contributed to its survival over the last 60 years and position it to continue to have many supporters. The tobacco program must be reauthorized by referendum of quota owners every three years. These referenda have consistently approved maintenance of the program by support of more than 90 percent of quota owners. This outcome is not surprising, considering the economic incentives the program provides to quota owners. Recall that quota is an asset with economic rents accruing to quota owners. Once quota owners capitalize an investment in quota, they have little incentive to abandon the rents that will accrue to that asset. A quota owner's spouse who depends upon income from quota rental to meet basic economic needs can be a persuasive political argument for maintaining the value of the institutionalized program.

Further, the tobacco program has sustained a relatively large number of small family farms over the years and has been successful in creating a structure that further supports continuation of the program. Barriers to quota movement across county and state lines have inhibited the transfer of quota to the lowest cost of production regions and thus preserved production areas where adoption of technologies with economies of scale would have not otherwise been feasible. This has allowed communities to become more dependent upon tobacco than they may have been otherwise. Termination of the program would likely shift production to lower cost production regions, affecting many rural communities, with limited economic opportunities, dependent upon tobacco income. While this argument may not hold ground in a debate about economic efficiencies, it can have persuasive power in a political debate.

Movement of the tobacco program to a no-net-cost program in 1982 strengthened support for program continuation. Further, as set forth in the Omnibus Budget Reconciliation Acts of

1990 and 1993, tobacco growers and manufacturers are assessed one percent of the support price on every pound of leaf tobacco marketed to be applied toward federal budget deficit reduction. On average, the deficit reduction assessment generates about double the federal cost of program administration (Womach).

Support for the existing tobacco program has also come from some unlikely sources, including some public health advocates. While the tobacco program does indeed accrue rents to producers, the supply restriction and resulting higher price transfers rents from both consumer surplus and producer surplus to quota owners in the form of monopoly or cartel rents. In some eyes the cost of the program, as measured by market inefficiencies, outweighs the cost of program elimination, which would be lower input costs and higher manufacturer profits which could then be passed on to consumers through lower tobacco product prices, leading to higher levels of tobacco product consumption. Many free market advocates have not pursued tobacco program elimination with the same fervor as other agricultural commodities. This may be due in part to the perceived 'social cost' of program elimination in terms of an economic windfall to an industry accused of deceiving the nation's consumers and knowingly contributing to health degradation. Thus, the program serves to transfer economic benefits from an industry with relatively little social standing to the more socially palatable farming community.

Despite support of the program, political pressure to modify or end the tobacco program has been gaining momentum over the past two decades. Some members of Congress and opponents of the tobacco program question how the federal government can support tobacco production while it simultaneously supports efforts to reduce tobacco consumption. Program opponents also argue that the existence of USDA administrative costs and crop insurance subsidies—estimated to be about \$14 million and \$48 million, respectively, in 1997 (Womach)—prevent the tobacco program from being a true no-net-cost program. All of

these questions and concerns are being debated in the wake of the Federal Agricultural Improvement and Reform Act passed in 1996, which terminated supply control and price stabilizing programs for most all major crops, leaving only the tobacco, peanut, and sugar programs intact. Collectively, these issues have resulted in very intense political debate on the program in recent years. While the program has survived previous attacks, most expect the political debate over the program to resurface once again this year.

In addition to political pressure from outside grower circles, the tobacco program presents some internal challenges and concerns for growers. First, while the program does provide price stability, it does not protect against quota instability. In fact, the program operates to stabilize price by destabilizing quota. This can be especially problematic for large growers who invest in achieving a productive capacity that is then dependent upon being able to secure sufficient quota. Once productive capacity investments are made, large quota cuts—such as the 18-percent cut in flue-cured quota in 1998 followed by a 17.5-percent cut in 1999—increase the rental rate of quota, increasing variable costs and reducing net returns in the short run. In the long-run a permanent quota decline forces some producers to exit production. Second, restricting quota transfer across county boundaries induces additional inefficiencies as it does not allow production to move to the lowest cost areas. Also, the program has provided an economic price “umbrella” under which foreign competition has developed. As a result, the program’s effectiveness has diminished in recent years as production increases and quality improvements overseas have weakened U.S. tobacco price competitiveness and thus market share.

Economic Fundamentals of Tobacco Production

Complicating the set of pressures to maintain, change, or eliminate the federal tobacco program, differing demand elasticities across types of tobacco, differing production characteristics by region, and differing quota ar-

rangements may lead to differing desires regarding program operation and continuation. Understanding the economic parameters associated with U.S. tobacco production is key to understanding or evaluating the potential consequences of changes in U.S. tobacco policy. This section presents the economic fundamentals of tobacco production which underscore differing incentives with regard to program changes or continuation across tobacco types, regions, and ownership arrangements.

Differences Between Types of Tobacco

Understanding the differences in economic fundamentals between the two major types of cigarette tobacco—flue-cured and burley—is useful in analyzing differences in effects from potential policy changes and, thus, different stances that various farm groups may take concerning a particular policy. First, the demand for flue-cured tobacco is likely more elastic than is the demand for burley tobacco. Beghin and Chang estimated the price elasticity of demand (output constant) of U.S. cigarette manufacturers to be about -0.1 for U.S. burley tobacco and about -0.9 for domestic flue-cured tobacco. The U.S. produces about 30 percent of the world burley production versus only nine percent of world flue-cured production (USDA-FAS). Further, foreign competitors in flue-cured production (mainly Brazil and Zimbabwe) produce flue-cured tobacco that is a much closer substitute for U.S. flue-cured than is foreign burley to U.S. burley. While there are few estimates of the export demand elasticity for flue-cured tobacco and no estimates for the export demand elasticity for burley tobacco, the above factors also imply that export demand, and hence total demand, for burley tobacco is less elastic than is demand for U.S. flue-cured tobacco.

While the tobacco program does not necessarily set the marketing quotas at the quantity that maximizes cartel rents, the fact that burley demand is less elastic than flue-cured demand implies that the rent maximizing quantity (at the intersection of the aggregate marginal revenue and supply curves) is small-

er for burley than it is for flue-cured tobacco.¹ Corroborating this insight is the fact that the burley marketing quotas have always been set at a lower quantity than the flue-cured marketing quotas. Despite lower marketing quotas, quota rental rates indicate that the marginal cost of producing burley tobacco is higher than that of flue-cured tobacco.² These economic fundamentals imply that burley farm groups will lobby for a lower national quota than will flue-cured farm groups. The less elastic demand of burley implies that burley quota owners have greater potential to extract cartel rents than do flue-cured quota owners. But this also implies that burley quota owners have more to lose from deregulation of tobacco than do flue-cured tobacco quota owners. As such, burley groups might be expected to offer greater opposition to attempts to eliminate the tobacco program.

Differences Among Tobacco Production Regions

The tobacco program also prevents the geographic movement of tobacco production. With the exception of Tennessee, marketing quotas cannot be sold or rented across county lines. Thus, production has been fixed geographically with the initial allocation of quotas in the 1930s. As production technologies have evolved over time, particularly towards more mechanization, substantial differences in production costs among different regions have emerged. For example, regions where the topography has favored adoption of mechanized transplanting and harvesting now have substantially lower per-unit costs of production

Figure 4. 1997 quota rental rates in tobacco producing states

than regions where adoption of mechanization has been more costly. In economic terms, at the start of the program marginal costs would have been expected to be equal across production regions. However, as technologies have emerged that favor one production region over another the tobacco program prevented movement of production that would have maintained an equilibrium of marginal costs among production regions. These differences in marginal costs are reflected in differences in quota rental values among counties. The marginal cost of production for a county can be found by subtracting the quota rental rate from the expected price per pound of tobacco. As such, each county is a separate quota rental market.

Figure 4 shows current quota rental rates for various production regions. Since the marginal cost of production is found by subtracting the quota rental rate for a county from the market price of tobacco, higher quota rental rates indicate lower marginal costs of production. Among the burley producing regions, the Appalachian region has the highest marginal costs. The mountainous terrain of the Appalachian region makes mechanization and consolidation of farms expensive. In many coun-

¹ The exception to this generalization would be if the cost of producing burley is sufficiently lower (due to the position of the supply curve) than that of producing flue-cured to cause the intersection of the marginal revenue curve and the supply curve to be at a quantity greater than for flue-cured. This does not seem to be the case.

² The implication of higher marginal cost of production for burley despite a lower total quantity supplied is that the supply curve for burley is positioned above the supply curve for flue-cured tobacco. This confirms that the cartel optimum for burley is at a lower quantity than for flue-cured.

Figure 5. Decline in demand with and without the tobacco program¹

ties in this region, quota rental rates are near zero and tobacco production is less than the quota for the county, especially in Tennessee where cross-county leasing is permitted within the state. The highest quota rental rates in burley are in central and western Kentucky where topography makes consolidation of farms much less expensive. Among the flue-cured producing regions, central North Carolina and Virginia have the highest marginal costs. However, unlike the high cost regions of the burley producing area, quota rental rates are substantially greater than zero and the quota is fully utilized. Southern Georgia and the coastal plains of North Carolina and South Carolina have the lowest marginal costs in the flue-cured production area.

Differences Among Quota Arrangements

Besides differences in economic fundamentals among regions and types of tobacco, there are also differences in economic fundamentals among individual tobacco farmers within regions and types of tobacco. The primary difference among tobacco farmers leading to differences in their desire to maintain or eliminate the tobacco program, as well as differing desires for price and quota levels under a program, is the degree to which the farmer

shares in the cartel rents garnered by the program. Farmers who own quotas for every pound of tobacco they grow earn cartel rents equivalent to the quota rental rate on every pound of tobacco they produce as well as any economic rents from producer surplus.

All farmers, either owning or renting quota, give up some producer surplus, at least in the short and intermediate term, due to supply restrictions of the program. For farmers who own quotas for all the tobacco they produce, cartel rents collected more than offset the sacrifice in producer surplus. However, for farmers renting quotas for a large share of the tobacco they produce, the cartel rents collected on the small share of quotas they own may not offset the potential short- and intermediate-term gains in producer surplus that would result if the program were eliminated. Thus, at a given point in time, producers owning quota for only a small share of their tobacco production may be more willing to give up the tobacco program than farmers who own quota for a large share of their production. Producers who own quota for a small share of their production may also be more willing to allow price to decline in order to maintain the national marketing quota than to allow the national marketing quota to decline (causing quota rental rates to increase) in order to maintain price.

Tobacco Production Under Alternative Policy and Program Arrangements

Some of the most notable proposals made during the recent U.S. Senate debate on the tobacco settlement would have increased cigarette prices and either maintained or eliminated the tobacco program. Though these proposals failed to materialize in 1998, legislators have indicated that these issues may resurface in 1999. While the mechanism for a cigarette price increase and the magnitude of the increase may change from the 1998 proposals, a substantial increase in cigarette prices via a tax or due to increased costs to cigarette manufacturers seems likely. Based on legislation enacted in 1997, the federal excise tax on cigarettes is already scheduled to in-

crease from \$0.24 to \$0.39 per pack by 2001. In addition, cigarette manufacturers boosted cigarette prices by over \$0.45 per pack in calendar year 1998 to cover projected settlement costs. Further, accompanying any tobacco legislation will likely be debate about whether or not to continue or alter the U.S. tobacco program.

Examining the effects of an increase in cigarette prices along with the effects of either maintaining or eliminating the tobacco program provides insights into the economic incentives that drive the political positions of health advocacy groups and farm groups on the continuation of a tobacco program. Sumner and Wohlgenant (1985, 1983) developed a model and examined the effects of an increase in the federal excise tax on cigarettes. More recently, Brown used a slight modification of this model to examine the farm-level effects of increases in cigarette taxes and smoking restrictions. The model presented in Brown is used to separately analyze the economic effects of an increase in the price of cigarettes on burley and flue-cured tobacco producers and quota owners under two scenarios, one in which the tobacco program is maintained and one in which the tobacco program is eliminated. The model is presented in the Appendix. For purposes of this discussion, a \$1.00-per-pack (50-percent) increase in the price of cigarettes is considered, which is smaller than the price increases proposed in 1998, but in line with many legislators' speculations about increases that might be proposed in the next round of legislative debates.

Estimates of the retail price elasticity of demand for cigarettes range from -0.28 to -0.80 (Wasserman *et al.*; Chaloupka, Batagi and Levin; Coate and Lewit; Jones; Becker, Grossman, and Murphy) with most clustering between -0.4 and -0.75 . Chaloupka, using an economic model developed by Becker and Murphy, estimated the long-run price elasticity of demand to range from -0.35 to -0.48 . More recently, Becker, Grossman, and Murphy, using the same model but a different data series, estimated the long-run price elasticity of demand to be -0.75 . The results presented in this paper are based on simulations of a

cigarette price increase under two scenarios in which two cigarette price elasticity of demands, -0.4 (Chaloupka) and -0.75 (Becker, Grossman, and Murphy), are used.

Following Beghin and Chang, the domestic price elasticity of demand for burley and flue-cured are assumed to be -0.1 and -0.9 respectively.³ The export price elasticity of demand is assumed to be -1.5 for burley and -3.0 for flue-cured tobacco.⁴ The total price elasticity of demand used for U.S. burley and flue-cured are then -0.53 and -1.75 respectively. Following Goodwin and Sumner, the aggregate supply elasticity under the tobacco program is assumed to be 4.0 . Without a tobacco program, the aggregate long-run supply elasticity is assumed to be perfectly elastic. Other parameters used in the simulations are presented in the appendix.

Simulating a Cigarette Price Increase

In the simulations, the derived domestic demands for U.S. burley and flue-cured tobacco shift back due to a movement back along the demand curve for U.S. cigarettes as the price increases. The cigarette price increase is due either to an increase in the cost of producing cigarettes resulting from mandatory payments

³ Sumner and Alston estimated the domestic demand elasticity for US tobacco (burley and flue-cured combined) to be -2 . However, more recently Rezitis, Brown and Foster, using a dynamic model, estimated the long-run domestic demand elasticity for US tobacco to be -0.4 . Using a share weighted average of the Beghin and Chang parameters yields an estimate of -0.56 . These latter results seem to support the idea that the domestic demand for US tobacco is inelastic.

⁴ Norton and Johnson estimated the export elasticity for US flue-cured tobacco to be -2.33 . However, since their work, US share of the world flue-cured trade has diminished and competing countries have succeeded in producing flue-cured tobacco that is a closer substitute to US flue-cured. This situation implies that export demand would have become more elastic. There are no estimates of the export demand elasticity for US burley tobacco. However, the economic fundamentals outlined in the previous section indicate that burley export demand is less elastic than US flue-cured export demand.

to the government⁵ or to an increase in cigarette taxes. Under the tobacco program, the quota shifts back with demand to maintain the farm price of tobacco. This is illustrated in Figure 3 where, under a program, as demand shifts back from D^0 to D^1 the national marketing quota—initially set at Q^{P0} —declines to Q^{P1} in order to maintain price P^{P0} . As tobacco production moves back and down along the upward sloping aggregate restricted supply curve⁶, S^P , marginal cost declines. The quota rental rate rises as the difference between price and marginal cost increases.

The simulation results indicate that under the current tobacco program a \$1.00-per-pack increase in cigarette prices could cause U.S. cigarette consumption to decline between 15 and 38 percent in the long run. Using a domestic price elasticity of demand for U.S. cigarette consumption of -0.4 and assuming a constant elasticity of demand yields the lower forecast (a 15-percent decline). The higher forecast (a 38-percent decline) is obtained by using a price elasticity of -0.75 and a linear approximation to U.S. cigarette demand. Given the range of elasticity estimates for cigarette demand, the large increase in cigarette prices, and the lack of estimates for the price elasticity of tobacco export demand, these forecasts are speculative. However, the assumptions and price elasticities used may provide reasonable bounds for the forecasts. More importantly, considerable insight into the economic incentives for various interest groups is gained, despite the speculative nature of the simulations.

The \$1.00 tax increase with maintenance of the current tobacco program would cause a decline in the burley tobacco quota (the quantity

needed to maintain the current farm price) of 7 to 17 percent in the long run (Table 1). As the quota declines, the difference between the marginal cost of producing burley tobacco and its price (which remains constant) increases so that the quota rental rate increases by 10 to 22 percent. This increase in quota rental rate more than offsets the decline in quota so that total quota rental income (i.e. cartel rents) actually increases slightly for burley tobacco quota owners. Similarly, a \$1.00-per-pack increase in cigarette prices results in a 6- to 15-percent decline in the national marketing quota for flue-cured tobacco in order to maintain the current farm price (Table 1). Quota rental rates in the flue-cured production areas rise on average between 5 and 13 percent. Unlike burley, total quota rental income for flue-cured quota owners declines. Neither exports of burley or flue-cured tobacco change since farm price is unaffected by declines in demand under the program.

Simulating a Cigarette Price Increase With Program Elimination

When the tobacco program is eliminated, price moves down along the new demand curve, D^1 (Figure 3), for U.S. tobacco (after the shift back in demand due to increased cigarette price) to the intersection of demand with an unrestricted and perfectly elastic long-run aggregate supply curve, S^{NP} . The unrestricted supply curve, S^{NP} , will lie at or below the intersection of the restricted supply curve, S^P , and the quota, Q^{P0} . The new price, P^{NP} , will equal marginal cost and all cartel rents will be transferred to the purchasers of tobacco (i.e. to consumer surplus). The quantity of tobacco produced will increase to Q^{NP1} .⁷

If, along with a \$1.00-per-pack increase in cigarette prices, the tobacco program is eliminated, the change in U.S. burley tobacco production is expected to range from -6 to $+8$ percent over the burley production levels under the program and before the price increase

⁵ If payments shift up the supply curve via shifting up individual marginal cost curves, then the payments must be per unit payments. Lump sum payments may be viewed as sunk costs and would not affect the marginal cost curve unless the government requires that cigarette companies raise cigarette prices.

⁶ The supply curve is restricted in the sense that tobacco production is fixed geographically under the program. These restrictions cause it to be more inelastic than in the absence of a program, even in the long run. See Goodwin and Sumner or Fulginiti and Perrin for a more detailed discussion.

⁷ If the shift back in demand were large enough, Q^{NP1} could be less than Q^{P0} . This is not the case for the level of cigarette price increase considered here.

Table 1. Effects of a \$1.00 per pack cigarette price increase under the current tobacco program

		Total Sales Million lbs	Total Farm Revenues Million \$	Quota Rental Rate \$/lb	Quota Income Million \$
Burley	Initial Level	605	1,107	0.30	181
	Change	-43 to -106	-78 to -193	+.03 to +.07	+2 to +3
	% Change	-7 to -17	-7 to -17	+10 to +22	+1 to +2
Flue-Cured	Initial Level	904	1,582	0.40	362
	Change	-55 to -136	-96 to -239	+.02 to +.05	-4 to -15
	% Change	-6 to -15	-6 to -15	+5 to +13	-1 to -4

(Table 2). Comparing the production levels after the price increase under the tobacco program versus with no program indicates that the quantity of burley tobacco produced would be 13 to 16 percent greater without a program. The farm price of burley tobacco in the absence of a program is expected to decline over 20 percent from its program level. With the price decline, exports of burley tobacco increase, partially or fully offsetting declines in use of burley tobacco by U.S. cigarette manufacturers.

In the case of flue-cured tobacco, production of flue-cured tobacco after the price increase and with elimination of the program would be expected to be 61 to 73 percent greater than the quantity produced before the tax increase and under the tobacco program (Table 2). Comparing elimination of the tobacco program and a \$1.00-per-pack increase in cigarette prices with the same cigarette price increase under the program indicates that flue-cured production would increase by 84 to 89 percent in the absence of the tobacco program. The price of flue-cured tobacco is ex-

pected to decline by about 27 percent. With the flue-cured tobacco price decline, potential growth in exports of U.S. flue-cured tobacco ranges from 80 to 155 percent. Recall that both domestic and export demand for U.S. flue-cured tobacco are thought to be much more elastic than demand for burley tobacco.

With the elimination of the tobacco program, income from quota is also eliminated. Because the long-run supply of tobacco is assumed to become almost perfectly elastic with deregulation of tobacco production, all annual cartel rents are transferred to consumer surplus.⁸ This represents a transfer of over \$180 million in annual income from burley tobacco quota owners to cigarette manufacturers and/or smokers. Almost \$350 million in annual income is expected to be transferred from flue-cured tobacco quota owners to cigarette manufacturers and/or smokers.

⁸ All cartel rents are transferred to consumers' surplus as long as the unrestricted (after program elimination) perfectly elastic aggregate supply curve goes through a point representing current or lower marginal cost of production.

Table 2. Effects of a \$1.00 per pack cigarette price increase and elimination of the tobacco program

		Total Farm Revenues Million \$	Total Sales Million lbs	Domestic Use Million lbs	Exports Million lbs	Price \$/lb
Burley	Initial Level	1,107	605	419	186	1.83
	Change	-160 to -286	-39 to +48	-34 to -99	+60 to +82	1.45
	% Change	-14 to -26	-6 to +8	-8 to -24	+32 to +44	-20
Flue-Cured	Initial Level	1,582	904	550	354	1.75
	Change	-106 to +415	+249 to +656	-36 to +106	+285 to +551	1.28
	% Change	-7 to +26	+27 to +72	-6 to +19	+80 to +155	-27

With elimination of the tobacco program total farm revenues from the sale of U.S. flue-cured tobacco are expected to increase between 10 and 34 percent compared to a scenario which maintains the current tobacco program and increases cigarette prices by \$1.00 per pack. This represents between a -7 and +26 percent change in farm revenues over the level before the price increase (Table 2). However, total farm revenues from the sale of U.S. burley tobacco decline between eight and 10 percent when the tobacco program is eliminated compared to a scenario that maintains the tobacco program and increases cigarette prices by \$1.00 per pack.⁹ This represents a 14- to 26-percent decline in farm revenues after the price increase and program elimination compared to farm revenues before the tax increase (Table 2).

Structural Implications for Price and Program Changes

Major changes in the national tobacco policy (i.e., elimination of the tobacco program, a relatively large reduction in the average price support level, or implementation of a relatively large excise tax increase) will have significant structural effects on tobacco farming communities. The differences in marginal costs among regions are important in analyzing the potential structural changes that would result from changes to the tobacco program. If the quota system were eliminated, total tobacco production would increase. However, production would decline in regions with the highest marginal costs while it would increase in regions with the lowest marginal costs.¹⁰

Rucker, Thurman, and Sumner analyzed potential changes in the location of production and accompanying welfare effects under a program scenario which allowed cross-county leasing in North Carolina but did not eliminate the program. With the elimination of county barriers to movement of production, they found that production would decline in the piedmont of North Carolina and increase in the coastal plain portion of the state. Since differences in marginal costs among regions are greater in the burley production area than in the flue-cured production area, it follows that greater structural change would be expected to occur in the burley producing regions if the tobacco program were eliminated. The Appalachian region might cease to produce tobacco entirely. Central and western regions in Kentucky and Tennessee likely would increase production of burley tobacco after some adjustment period.

Even though tobacco production evidently was not the most profitable use for land outside the current tobacco producing regions sixty years ago when the tobacco program established and froze the geographic location of production, that might not be the case now. Thus, elimination of the tobacco program could result in production of tobacco outside the current producing areas. The greatest structural change may ultimately occur in Kentucky and the Appalachian region, which possesses over one-half of all the farms growing tobacco in the United States and have the greatest economic dependency on tobacco. The current program imposes significant transaction costs for consolidation of farms because of the regulations governing consolidation of

⁹ The lack of an export elasticity estimate for burley tobacco is problematic. However, given the domestic elasticity estimate of -0.1, in order for farm revenues from burley tobacco to expand after program elimination, the export elasticity would have to be -5 or greater (in absolute value). An export elasticity of this magnitude seems unlikely.

¹⁰ How much production increases or decreases within a particular county depends on the slope of the aggregate supply curve for tobacco production in the county. For most counties, land for tobacco production would be the limiting factor of production that could cause a long-run county supply curve to be upward

sloping. In many counties, particularly those in the coastal plain areas of North and South Carolina, tobacco production occupies only a small percentage of total cropland. In these counties, the long-run supply curve, in the absence of a program, would be expected to be close to perfectly elastic around the current quantity of tobacco produced under the program. However, in some counties, such as those in the Appalachian region or the piedmont of Virginia or North Carolina, tobacco production occupies a high percentage of the tillable cropland. In these counties the long-run supply curve may be fairly inelastic around the current quantity of tobacco produced under the program.

quota and the marketing of tobacco. Elimination of the program would then reduce the cost of consolidation increasing economies of scale associated with tobacco production. These factors point to a potentially large net exit of tobacco farmers despite an overall expansion in tobacco production.

Under the current structure of the tobacco program, small-scale producers may have some cost advantages over larger producers given their access to family labor and the use of depreciated assets. However, small-scale producers' access to markets and credit and their ability to remain low-cost producers is questionable under the structure of a freer market environment. Contracts offered by tobacco companies and dealers are the means of marketing tobacco in many countries. If a contract marketing system were to evolve, tobacco companies (or their agents administering the contract system, which could include leaf dealers or warehouse owners) would likely initially seek existing tobacco growers who have access to large and productive tracts of land. Given the current infrastructure available, tobacco production may initially stay in traditional tobacco producing states in the short-run. Given time, however, production could move into non-traditional areas based on production costs and quality considerations.

Southern Georgia and the coastal plains regions of North and South Carolina likely would experience large increases in flue-cured tobacco production. Virginia and the central part of North Carolina, where flue-cured production costs are highest, would experience declines in flue-cured tobacco production and, subsequently, farm income. These areas are the least agriculturally diversified regions within the flue-cured producing area. Few farm alternatives with similar income producing potential to tobacco exist in these hilly and rolling regions, where tobacco occupies a high percentage of tillable land. Given the managerial expertise for growing tobacco in these areas and the suitability of the soils for growing burley tobacco, one possible alternative crop to flue-cured tobacco for Virginia and central North Carolina might be the less mechanized burley tobacco. For many farmers in

these regions, off-farm employment would be the alternative of choice, as the region is highly industrialized with healthy growth in this sector projected. Production under the current tobacco program will not be easy for the flue-cured region either. With reduced quotas and large production capacity, particularly in the flue-cured areas, many farmers may have difficulty covering all of their fixed costs. Competition among farmers for available quota is intense in the flue-cured areas. This will ultimately lead to the exit of some farmers, although not as many as with the elimination of the tobacco program.

Policy Implications for Price and Program Changes

With the current political trend moving away from farm programs, many farm groups in tobacco-producing states fear that the tobacco program will share a fate similar to other farm programs. Even though the tobacco program is authorized by permanent legislation and not a part of the farm bill, Senator Richard Lugar (current Chair of the Senate Committee on Agriculture and a strong advocate of freer markets) has vowed to eliminate the tobacco program. However, even Senator Lugar acknowledges that tobacco is different from other agricultural commodities and that more tobacco at a cheaper price may not be desirable for society.

In the past, cigarette manufacturers have been strong supporters of the tobacco program—even though it can reduce the demand for cigarettes and/or increase their production costs—in return for political support from farmers and other quota owners. Manufacturers still value political support of the farming community, as evidenced by their recent efforts to voluntarily provide economic assistance to tobacco farmers negatively impacted by the settlement of state Medicaid lawsuits, but the political influence of the producer community may not carry the same weight in the manufacturers' eyes in the future. It appears that the manufacturers achieved a higher level of political support from a \$45-million ad campaign that appealed to smokers and tax-

payers during the Senate debate on the settlement last summer than they will likely be able to achieve in the future from producers and quota owners. However, as long as cigarette manufacturers are under the threat of legislative action that could reduce the demand for cigarettes or increase their cost of operation, cigarette manufacturers may have an incentive to continue support for maintenance of a tobacco program in return for political support from the farming community.

Health advocacy groups will likely continue to debate the merits of supporting maintenance of a tobacco program that potentially increases the political base of cigarette manufacturers but may reduce cigarette demand through higher costs of production and transfers some of the economic surplus from manufacturers to growers versus supporting elimination of the program resulting in less political support for cigarette manufacturers but also resulting in a large economic windfall to cigarette manufacturers. Several of the major health advocacy groups have been working with tobacco farmers in recent years to understand the complexity of the tobacco issue from a production and rural community standpoint. In January 1998, a document which outlines broad points of agreement parties have reached a consensus on, including support of a tobacco program, was prepared jointly by a group of public health advocates and tobacco producers. The "Core Principles of Agreement Between the Public Health Community and the Tobacco Producer Community" has since been signed by nearly 100 public health, political, and farm organizations, including the American Cancer Society, the American Heart Association, the American Public Health Association, the Burley Stabilization Corporation, the Burley Tobacco Growers Cooperative, Inc., and the Flue-Cured Tobacco Stabilization Corporation. The current strategy of health advocacy groups supporting continuation of a tobacco program in return for political support from farm groups for some anti-smoking initiatives, especially limiting youth access to tobacco products, will likely continue.

Thus, in an ironic twist, the health-related

problems that plague tobacco may also be the best defense for the continuation of a tobacco program. Continuation of the current tobacco program, if possible, will be with reduced levels of national quota due to declining domestic demand for cigarettes and intense foreign competition. Most burley tobacco growers and quota owners may find the status quo the most desirable alternative, even at reduced quota levels. Burley price and quota currently is set in the inelastic portion of the burley tobacco demand curve. This indicates that burley tobacco farm organizations may actually want to increase price and reduce quota further. As a result, farm organizations representing burley tobacco growers and quota owners, from states such as Kentucky and Tennessee, will likely continue to lobby for the continuation of the current tobacco program.

A consensus is much more difficult to reach among flue-cured tobacco growers and quota owners. Growers and quota owners in central North Carolina and Virginia, where production costs are highest, are likely to agree with most burley groups in their support of tobacco program continuation. Flue-cured tobacco growers who own quota for most of their tobacco production and non-producing quota owners are also likely to favor continuation of the current tobacco program, even in the face of reduced quota levels. Flue-cured tobacco growers who rent quota for a substantial portion of their production, particularly those in the coastal plain of the Carolinas and in southern Georgia, are likely to be less supportive of continuation of the current tobacco program. In the face of declining quotas, many of these growers may support allowing tobacco prices to decline in order to maintain quota levels or even eliminating the program altogether. While there may be fewer growers with these circumstances than other types of tobacco growers, they generally have larger farming operations and grow the majority of the domestic flue-cured tobacco. Because of their financial stake in the longevity of tobacco in the U.S. they tend to be vocal and very politically active.

Conclusions

Should national legislation concerning smoking and tobacco resurface in the near future, are there reasonable compromises concerning the U.S. tobacco program that could satisfy all the stakeholders in the program? A phase-out of the tobacco program with quota owners receiving compensation for their quota has the potential (given high enough compensation levels) to find the support of most tobacco growers and quota owners. If the quota compensation were funded by increased cigarette taxes or from payments from cigarette manufacturers, then health groups would likely be agreeable in that cigarette manufacturers would be denied a large economic windfall from elimination of the tobacco program and the farm level political base of cigarette manufacturers would be reduced. Of course, an undesirable effect of this strategy from a public health standpoint would be that the U.S. would grow and export more tobacco at much lower prices, potentially raising new world health concerns. Cigarette manufacturers might oppose such efforts since they would lose much of their farm level political support and be denied economic gains from elimination of the tobacco program.

A more palatable compromise for most involved might be continuation of the current tobacco program with no changes for burley tobacco but with a lowering of price support, with compensation to quota owners in the flue-cured tobacco producing areas. Brown and Martin explored the trade-off (without compensation) between reduced price and reduced quota for flue-cured tobacco growers, non-producing quota owners, and rural economies. With compensation for allowing market price to fall by lowering support prices, flue-cured quota owners (both growers and non-growers) could be made indifferent to the change in price. Flue-cured growers who rent most of their quota might support the change since they would experience smaller declines in national quotas (or even an increase depending on the magnitude of the price decline). With reduced price, quota rental rates would decline. The painful structural change

and geographic changes in production associated with ending the program would be avoided. While flue-cured production would not decline as much (or could even increase) as under the current program, health groups might be satisfied with a program that held production below and prices above free market levels. Further, cigarette manufacturers could be denied economic gains from lower prices if compensation were financed from increased cigarette taxes or payments from cigarette manufacturers, making the plan more palatable to health groups. Cigarette manufacturers might be indifferent to the plan if they were forced to pay compensation for the lowering of flue-cured tobacco prices.

On the other hand, promoters of free markets, such as Senator Lugar, might feel less than victorious with a plan that leaves the tobacco program intact, even if price and production were allowed to move closer to free market levels for flue-cured tobacco. With the exception of administrative costs, the tobacco program operates at no cost to the federal government. The administrative costs could also be shifted to fees or assessments paid by tobacco farmers and purchasers of tobacco. Even with no cost to the government the maintenance of a tobacco program and its political base of growers and quota owners ensures that tobacco state legislators would have to continue to deal with the controversy surrounding the tobacco program.

A solution that pleases all parties involved will be difficult if not impossible to find and implement. Given the mixed incentives for keeping versus eliminating the tobacco program, the controversy is likely to continue. Predictions that the end of the tobacco program is near have been rampant since the first Surgeon General's report that implicated smoking as harmful to health. The program was pronounced dead in the mid-1980s amid skyrocketing program costs, increasing international competition, and increased concerns about smoking, only to be revived as a no-net-cost program (Rucker). The program has also experienced major challenges during the 1990s, with the most serious challenges arising during the national tobacco settlement de-

bate in 1997. Despite all the problems surrounding the tobacco program, it has survived for over 50 years. While future survival remains highly uncertain, the ultimate irony is that the program's salvation may be the very issue once thought to be the cause of its demise.

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Appendix

To simulate the effects of an increase in cigarette taxes under the current tobacco program equations 1-9 are solved as given in Brown and in Sumner and Wohlgenant (1983, 1985). Definitions of variables and parameter values are given in appendix Tables 1 and 2. The proportionate change in a variable is indicated by the operator E. For an in-depth treatment of the model and its use see Brown or Sumner and Wohlgenant (1983, 1985).

- (1) $EQ_{cd} = -\eta_{cd}EP_{cd}$
- (2) $EQ_{ce} = -\eta_{ce}EP_{ce}$
- (3) $EQ_c = \beta_{cd}EQ_{cd} + (1 - \beta_{cd})EQ_{ce}$
- (4) $EP_{cd} = \alpha_{cd}EP_{td} + \alpha_T ET$
- (5) $EP_{ce} = [1/(1 - \alpha_T)](EP_{cd} - \alpha_T ET)$
- (6) $EQ_{td} = \alpha_{td}\sigma_{dd}EP_{td} + EQ_c$
- (7) $EQ_{te} = -\eta_{te}EP_{td}$
- (8) $EQ_t = \beta_{td}EQ_{td} + (1 - \beta_{td})EQ_{te}$
- (9) $EQ_t = \epsilon EP_{td}$
- (10) $ER_t = EP_{td} + EQ_t$
- (11) $EL_t = (1/\alpha_L)$
- (12) $EP_{td} - ((1 - \alpha_L)/\alpha_L)\mu EQ_t$

Table A1. Definitions of endogenous and exogenous variables

Symbol	Definition	Value
Exogenous Variable		
T	Federal excise tax per pack of cigarettes.	\$0.74
Endogenous Variables		
Q_{cd}	Quantity of cigarettes sold in U.S. by U.S. manufacturers.	
P_{cd}	U.S. wholesale price of cigarettes.	
Q_{ce}	Quantity of cigarettes exported by U.S. manufacturers.	
P_{ce}	Price of U.S. manufactured cigarettes for export.	
Q_c	Total quantity of cigarettes produced by U.S. manufacturers.	
P_{td}	Farm sales price of U.S. tobacco	
Q_{td}	Quantity of U.S. tobacco purchased by U.S. manufacturers.	
Q_{te}	Quantity of U.S. unmanufactured tobacco exports	
Q_t	Total quantity of domestically produced tobacco.	
R_t	Total domestic tobacco revenue.	
L_t	Market rental rate for tobacco quota.	

Table A2. Parameter definitions and values

Parameters		Burley	Flue-cured
η_{cd}	Domestic wholesale price elasticity of demand for cigarettes.	0.4, 0.75	0.4, 0.75
η_{ce}	Export wholesale price elasticity of demand for cigarettes.	0.8	0.8
β_{cd}	Quantity share of U.S. cigarettes sold in the U.S. market.	0.67	0.67
α_{td}	U.S. tobacco share of domestic wholesale cigarette costs.	0.016	0.019
α_T	Tax share of domestic wholesale cigarette costs.	0.18	0.18
σ_{dd}	Own-elasticity of substitution for domestic tobacco	6.17	46.59
η_{te}	U.S. export price elasticity of demand for domestic tobacco.	1.5	3.0
β_{td}	Quantity share of domestic tobacco used in U.S. cigarettes	0.69	0.60
ϵ	Domestic tobacco output response elasticity.	∞	∞
α_L	Average cost share of quota rent in tobacco production.	0.16	0.23
μ	Elasticity of marginal cost of tobacco production	0.25	0.25