Section IV
Supply of tobacco

13
The supply-side effects of tobacco-control policies

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This chapter examines whether tobacco-control policies will have a detrimental effect on countries' economies, in particular on employment, and examines the impact of supply-side interventions. For the majority of countries, even stringent tobacco-control policies will have either a minimal impact or no net impact on total employment, as money that would formerly have been spent on tobacco tends to be spent on other goods and services. However, for a handful of tobacco-exporting countries that are not diversified, falling demand for tobacco would result in job losses, although such transitions would be gradual. Supply-side policies, such as price supports and quotas, provide incentives to grow tobacco, but their net impact on retail price, and hence consumption, is small. Given high demand and the presence of alternative suppliers, policies such as crop diversification or buy-outs are largely ineffective in reducing the supply of tobacco or its consumption. Nevertheless diversification, placed within broader rural development programs, can help meet the transition costs of the poorest farmers. Ultimately, the most effective supply-side policy may be to focus on reducing the demand for tobacco, and to allow supply to respond to slow changes in demand.

13.1 Introduction

This chapter addresses the supply-side impact of tobacco-control policies, specifically the macro-economic, employment, and agricultural issues. These are important political issues, given that supply-side stakeholders, mainly farmers and manufacturers of tobacco products, tend to form a political and emotional lobby to resist control policies that jeopardize their interests. Consequently, policy-makers are likely to be required to balance the public health imperative of reducing smoking against the economic interests of their tobacco-producing or tobacco-manufacturing constituents.

We address some commonly-held concerns about the macro-economic impact of tobacco-control measures. For example, the discussion examines the view, frequently voiced by the tobacco industry, that measures such as raising tobacco taxes would cause large and precipitate job losses, reduce total tax revenue, or alter the trade balance. We also address the question of how policy-makers who decide to implement tobacco-control measures can strategize the transition in agriculture to reduced dependency on tobacco crops. Are supply-side measures effective in reducing consumption? What is the impact of farmer subsidies or price-support measures? Should policy-makers

encourage substitution from tobacco to alternative crops, or even buy-out tobacco producers altogether?

The chapter is in four sections. First, we describe tobacco farming and manufacturing, including the shift in tobacco production to low-income countries, and the size of the tobacco industry. Second, we examine whether tobacco-control policies have any detrimental impact on economies. We analyze studies, both independent and industry-sponsored, on this topic and revisit some of their conclusions. We also examine differences in the impact of control policies in countries that are net importers or exporters of tobacco, and go on to describe job losses stemming from improvements in the tobacco industry's manufacturing technology. Third, we examine the effectiveness of a range of supply-side interventions, such as subsidies, diversification, 'buy-out' efforts or attempts at outright bans on production. Finally, in the conclusion we briefly discuss research priorities.

13.2 Tobacco farming and the tobacco-manufacturing industry

One of the chief obstacles to tobacco-control measures is the economic and political importance of tobacco farming in many countries around the world (Altman *et al.* 1996). Understanding the tobacco industry and agricultural sector is essential, therefore, to the formation of a tobacco-control policy. The following sections examine the key players in tobacco production and trade, and the size of the global industry in terms of the amount of employment it creates, so as to assess how many people would be potentially affected by control policies. We focus on tobacco farming as it has attracted the most debate (ITGA 1996a, 1996b), and because it contributes far more to jobs than does cigarette production.

13.2.1 The top tobacco-producing countries

Tobacco is grown in more than 100 countries, including about 80 developing countries. Given its hardiness, tobacco grows well in a variety of climates and topographies. The largest producer of tobacco, as shown in Table 13.1, is China, which has been increasing its share of production rapidly. The United States is the second-largest producer, but its share is currently falling. India and Brazil follow the United States, and they have also been increasing their share of global production. These four countries account for about two-thirds of production world-wide. The top 20 countries, with their diverse mix of income levels, account for approximately 90% of production.

Table 13.1 reveals that many of the tobacco-growing countries export a large share of their tobacco production. Zimbabwe, Italy, and Kyrgyzstan export around three-quarters or more of theirs. Other countries with high export shares are Brazil, Turkey, Malawi, Greece, Argentina, and Spain. Many of these countries use a considerable amount of tobacco leaf domestically in cigarette manufacturing. Of the top 20 producing countries, only Zimbabwe and Malawi do not have a significant cigarette manufacturing industry. There is considerable 'cross-hauling' (Gale *et al.* in press) in Spain, where exports and imports are both large. Japan is the largest net importer. China is essentially self-sufficient in tobacco, as are Indonesia, Pakistan, and Bulgaria. Despite a projected increase in tobacco production for the future, the total area of land

Table 13.1 The top tobacco-growing countries, the area cultivated, and import and export ratios

Country	Area (1000 hectares)	Share of total world area (%)	Production of leaf (1000 metric tons)	Production change	Share of world total volume (%)	Export ratio[a] (%)	Import ratio[b] (%)	Tobacco export revenue as % of total export
	1997	1997	1997	1975–97	1997			1995
China	2353.0	43.9	3920.0	308.3	45.6	2.3	0.4	0.68
USA	328.4	6.1	810.1	–18.2	9.4	28.3	37.9	0.55
India	420.2	7.8	623.7	71.8	7.2	6.1	0.0	0.44
Brazil	346.2	6.5	619.8	116.7	7.2	51.5	3.1	2.55
Turkey	294.7	5.5	286.0	43.0	3.3	56.8	19.0	1.17
Zimbabwe	99.3	1.9	215.3	148.4	2.5	76.6	4.8	23.05
Malawi	114.8	2.1	158.1	352.7	1.8	59.5	0.8	60.64
Indonesia	219.9	4.1	139.7	46.1	1.6	30.2	33.7	0.42
Greece	65.9	1.2	136.9	15.0	1.6	69.5	10.9	2.05
Italy	48.0	0.9	133.0	17.3	1.5	74.4	25.9	0.04
Argentina	69.7	1.3	123.2	26.0	1.4	52.4	4.6	0.59
Pakistan	48.9	0.9	91.6	19.5	1.1	0.3	0.0	0.08
Thailand	49.7	0.9	74.2	18.3	0.9	25.6	12.8	0.11
Canada	26.0	0.5	70.3	–33.7	0.8	44.8	26.4	0.04
Japan	26.5	0.5	68.0	–59.0	0.8	9.1	144.7	0.04
Philippines	57.8	1.1	65.0	13.8	0.8	26.3	33.7	0.17
South Korea	27.2	0.5	54.3	–47.8	0.6	6.1	23.8	0.02
Bulgaria	38.0	0.7	51.8	–68.0	0.6	24.9	22.2	5.40
Spain	17.0	0.3	43.0	66.0	0.5	51.2	129.3	0.06
Dominican Rep.	18.8	0.4	39.2	13.3	0.5	48.4	0.0	5.26
Bangladesh	34.8	0.7	38.1	–5.6	0.4	1.7	4.5	0.03
Poland	16.7	0.3	32.3	–68.4	0.4	17.4	137.6	0.12
Cuba	41.5	0.8	31.4	–25.6	0.4	25.4	14.9	N/A
Colombia	15.8	0.3	28.7	–50.1	0.3	29.5	6.4	N/A
Vietnam	28.3	0.5	28.3	112.8	0.3	1.8	13.8	0.04
South Africa	15.0	0.3	26.4	–3.9	0.3	28.7	56.6	0.31
Kyrgyzstan	8.5	0.2	25.7	N/A	0.3	74.2	0.0	6.96
Tanzania	32.5	0.6	25.0	77.2	0.3	24.9	0.0	4.53
World Total	5358.9	100.0	8603.4	58.7	100.0	21.8	23.0	

[a] Ratio of exports to domestic production.
[b] Ratio of imports to domestic production.
N/A = not available.

Source: USDA (1998); FAO (1998); IEC (1998).

under tobacco is falling, as better cultivation methods lead to higher productivity. The 5.3 million hectares under tobacco account for less than 1% of the world's arable crop area (approximately half the area devoted to coffee) (Food and Agriculture Organization 1989, 1998).

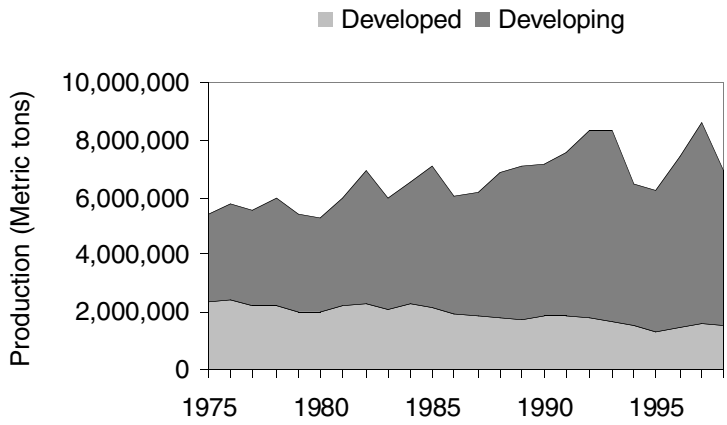

Fig. 13.1 Tobacco production by developed and developing countries, 1975–98.

Source: FAO (1998).

In most countries, tobacco export revenue, as a share of total export, is below 1%. A few countries receive a more significant share of foreign exchange earnings—between 2% and 5%—from tobacco; they include Tanzania, Kyrgyzstan, the Dominican Republic, and Bulgaria. Only Zimbabwe and Malawi are highly dependent on tobacco for export earnings, with tobacco accounting for 23% and 61% of total exports, respectively.

13.2.2 The shift of tobacco farming to developing countries

In recent decades, the growth in world tobacco production has come primarily from low-income and middle-income countries. Between 1975 and 1998, production in developed countries fell by 31%, while production in developing countries rose by 128%, as shown in Fig. 13.1.

As shown in Fig. 13.2, Asia (including the Middle East) increased its share of world tobacco production from 40% to 60% during the period 1977–97, while the total share of the high-income countries fell from 30% to 15%. Africa's share rose from 4% to 6%. The share of tobacco grown in Eastern Europe and the states of the former Soviet Union fell during the 1990s.

In many developing countries, there has been considerable emphasis on agricultural research to increase the efficiency of tobacco farms. The aims have included raising farmers' income and exports, reducing reliance on imported tobacco, and earning or conserving foreign exchange. An additional factor is the growth in demand for tobacco products in developing countries, as incomes and purchasing power have grown. In some countries, farmers have been encouraged to plant tobacco to supply new processing plants built to expand local cigarette production. Many developing countries are attempting to increase cigarette exports or substitute domestic products for imported cigarettes. Increasing taste for Western-style cigarettes has spurred demand for flue-cured Virginia tobacco (Joossens and Raw 1996).

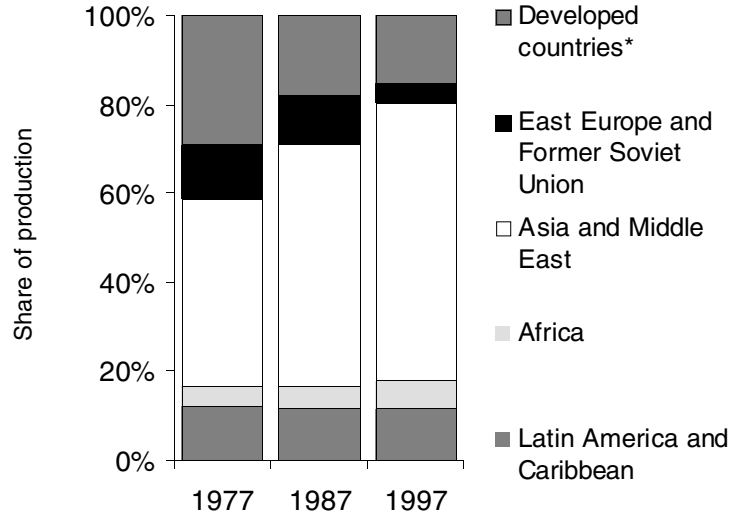

Fig. 13.2 Shares of world tobacco production, by region, 1977–97. Developed countries* include North America, Western Europe, and Japan.

Source: FAO (1998).

13.2.3 The size of the tobacco farming and manufacturing industries

Few reliable estimates are available on the current size of either the farming industry or the manufacturing industry. Tobacco-industry estimates suggest that worldwide, some 33 million people are employed in tobacco growing, usually part-time, counting family members, seasonal workers, and other laborers. It is estimated that approximately 15 million people are employed in tobacco farming in China alone (Skolnick 1996), 3 million in India (Patel 1992), 488 000 in the Philippines (Ernst and Young 1991), and nearly 100 000 in Zimbabwe (Maravanyika 1997). In the European Union there are 135 000 tobacco farms and an estimated 170 000 laborers located largely in Italy, Greece, Spain, and France. The United States has about 120 000 farms. There are no reliable independent estimates of the number of seasonal laborers.

However, from a macro-economic perspective, the important statistic is the *percentage* of those employed in any country that are dependent on tobacco products for their livelihood, and not the absolute numbers of people employed. Thus, even in Malawi, the percentage of people employed in tobacco relative to other agricultural products is small. There are also several conceptual difficulties in estimating the absolute numbers. Tobacco labor on farms and in primary processing is seasonal, and its contribution to the formal economy is unclear. Laborers include migrants, unpaid family members, and casual laborers from the community. Few hired workers work full-time in tobacco farming or primary processing (Gale 1998). It is therefore misleading to compare employment figures in these sectors of the tobacco industry with employment from sectors where jobs are full-time and year-round. As Table 13.2 indicates, in developing countries when full-time equivalent (FTE) figures are used,

Table 13.2 Employment in tobacco growing in various developing countries, 1990, ranked by the share of tobacco-growing jobs in total labor force

	Share of agriculture in total GDP (%)	Number employed in growing tobacco ('000)	FTE employed in growing tobacco ('000)	Tobacco FTE as % of agricultural labor force (%)	Tobacco FTE as % of total labor force (%)
Malawi	33	157	93	2.34	2.03
Turkey	18	560	313	2.41	1.29
Philippines	22	488	301	2.71	1.24
China	27	15998	6152	1.25	0.90
Zimbabwe	13	92	39	1.25	0.85
Sri Lanka	26	150	50	1.50	0.73
Colombia	17	302	101	2.73	0.73
Thailand	12	1362	213	1.05	0.67
Iraq	18[a]	57	29	3.90	0.63
Indonesia	22	1466	454	1.02	0.57
Malaysia	2[a]	100	39	1.96	0.54
Myanmar	N/A	350	114	0.73	0.53
Brazil	10	600	289	1.90	0.44
Bangladesh	38	409	205	0.61	0.40
Argentina	13	105	44	2.97	0.36
Tanzania	59	178	47	0.43	0.36
Cuba	N/A	20	17	1.95	0.35
Venezuela	6	95	23	2.63	0.32
India	31	3500	1108	0.48	0.31
Syria	28	54	10	0.87	0.29
Tunisia	16	15	7	0.87	0.24
Guatemala	26	24	7	0.45	0.23
Pakistan	26	205	86	0.39	0.20
Nigeria	36	217	42	0.28	0.12
Congo	30	21	13	0.12	0.08
Morocco	16	15	7	0.17	0.08
Kenya	28	11	5	0.06	0.04
Chile	9	4	2	0.21	0.04
Average[b]	26	NA	NA	1.01	0.63

FTE = full-time equivalent; [a] 1965 values; [b] average is weighted by total labor force.

Source: Chapman and Wong (1990); Ernst and Young (1991); Patel (1992); World Bank (1992); Skolnick (1996); FAO (1998); ILO (1998).

the average FTE is typically about one-third of the total absolute number reported by the tobacco industry (Chapman and Wong 1990).

Many farms that grow tobacco grow only a small amount, and most tobacco operations are extremely small, averaging less than 1 hectare in many developing countries. Only in parts of the United States and Zimbabwe are large-scale tobacco operations common, due to the difficulties involved in mechanization and the predominance of smallholders. In the United States the allotment system, discussed below, has served to keep many farms small.

In certain low-income and middle-income countries, tobacco growing is important for several reasons, chiefly because of its labor intensity and its ability to generate dependable cashflow for poor small farmers. Tobacco is among the more labor-intensive crops (and an additional reason why farms are small). Seasonal labor is required for transplanting young plants from seedbeds or greenhouses to fields, and for removing tops when plants begin to flower and suckers that grow out from the stalk (to maximize growth and quality of leaves). Flue-cured tobacco is harvested by removing a few leaves at a time, a very labor-intensive process. Machines are available for flue-cured harvesting and have been adopted in some areas, but there is no mechanization for burley tobacco. Curing is also often done on the farm to ensure the correct moisture, nicotine, and sugar content, which affect the quality and taste. Mechanization has been difficult to achieve in tobacco farming, due to the complexity of these tasks. Additionally, much tobacco is grown on hilly or mountainous land that is unsuitable for mechanised equipment (Chapman and Wong 1990).

Many of the developing countries, shown in Table 13.2, that grow tobacco, have highly agrarian economies with large proportions of the total labor force in agriculture. Most of these economies are, however, diversified in that they produce various agricultural products. The relative contribution of agriculture to gross domestic product (GDP) is falling: between 1965 and 1990, the contribution of agriculture shrank from 29% to 17% in low-income and middle-income countries (World Bank 1993).

In contrast to farming, tobacco manufacturing is a mechanized production process and generates few jobs. Table 13.3 below shows employment in tobacco manufacturing for selected countries for 1990. In very few countries does tobacco manufacturing make up more than 1% of total manufacturing employment. The nature and size of the multinational tobacco industry has been discussed elsewhere (Johnson 1984; WHO 1999).

We now examine the impact of control policies on key economic variables, chiefly employment.

13.3 Do tobacco-control policies have a detrimental effect on the economy?

To combat tobacco-control policies, the tobacco industry has long argued that nations are economically dependent on tobacco for employment and incomes. The argument is usually put forward that measures that threaten tobacco sales bring serious political risks because of damage to the economy. We review studies that have estimated the impact of tobacco-control policies on employment, tax revenue, and incomes. These studies have been commissioned by the tobacco industry and also by independent researchers.

13.3.1 Industry-commissioned studies on the economic contribution of tobacco

A large number of industry-sponsored studies have suggested that tobacco-control policies would have a detrimental impact on the economies of high-income countries

Table 13.3 Employment in cigarette manufacturing as a proportion of total manufacturing employment for selected countries, 1990, ranked in absolute numbers

Country	Employment in tobacco manufacturing	Proportion of total manufacturing employment
China	265 000	N/A
Indonesia	241 126	5.32
United States	41 000	0.19
Russia	33 000	N/A
Turkey	32 142	1.56
Bangladesh	27 155	1.6
Egypt	17 513	1.24
Italy	15 845	0.39
Bulgaria	15 300	N/A
Philippines	13 941	0.88
United Kingdom	13 000	0.25
Japan	12 000	0.09
Thailand	10 500	0.55
Iran	10 500	1.28
Poland	10 000	0.25
Pakistan	9 400	0.60
Spain	8 607	0.32
Korea Republic	7 200	0.17
Netherlands	7 000	0.61
Romania	6 200	0.18
Zimbabwe	5 414	N/A
Mexico	5 240	0.14
France	5 100	0.12
Canada	5 000	0.23
Hungary	5 000	0.43

N/A = not available.

Source: UNIDO (1998).

(for the United States: Wharton Applied Research Center 1979; Chase Econometrics 1985; Price Waterhouse 1990, 1992; Tobacco Merchants Association 1995; American Economics Group 1996; for Europe: PEIDA 1985; Agro-Economics Services Ltd. and Tabacosmos Ltd. 1987; for Canada, Deloitte & Touche 1995; for Hong Kong: Coopers & Lybrand 1996). Economic consulting firms typically estimate the employment attributable to the growing of tobacco as well as to the manufacture, distribution, and sale of tobacco products. They also calculate the incomes associated with this employment, tax revenues generated by the sale of tobacco products, and, where relevant, the contribution to a country's trade balance.

Generally, these studies estimate *gross* employment and do not consider that the decline of one economic activity (tobacco) would be replaced by alternative spending

and economic activity that would generate alternative employment. The tobacco industry uses the gross estimates made in these studies to indicate the significance of tobacco in the economies and to make gross projections of jobs and tax revenues that will be lost on adoption of tobacco control policy measures. Further, based on these estimates, multipliers then establish the indirect effects of the industry's employment contribution to other sectors. The multipliers used in these studies are useful insofar as they estimate the effect of one type of economic activity in stimulating additional economic activity (output multipliers), but not the actual number of jobs dependent on tobacco spending (Arthur Andersen Economic Consulting 1993). In general, the industry-commissioned estimates use generous multipliers.

13.3.2 Independent studies on the economic contribution of tobacco

In recent years, macro-economic research in several countries has challenged the conclusions of the industry studies. Unlike the industry-commissioned studies that stop with the gross economic contribution of tobacco, the numbers of jobs, earnings, and taxes paid, the independent studies estimate the *net* impact by comparing tobacco-related economic activity with assumed production after the redistribution of the resources that would be freed from tobacco consumption to alternative uses (Warner 1987). Table 13.4 provides the results of these quantitative independent studies, and some qualitative studies.

Most of the independent studies simulate the net impact on economic activity from eliminating or reducing expenditure on tobacco, and make certain assumptions about how the alternative expenditure will take place in the economy. Their basic underlying assumption is usually that of zero or greatly reduced expenditure on cigarettes. This is obviously an extreme assumption. However, since the input–output models used are essentially linear, the resource reallocations following specified reductions or elimination of tobacco can be approximately interpolated from the results.

The results of most of the studies show that job losses occur in the sectors that are immediately associated with cigarette production: tobacco manufacturing and farming, and the cigarette retail, wholesale and distribution sectors. In some cases, jobs would also be lost in government if there were a loss in government revenue. However, these losses are outweighed in most studies by increases in employment in all other industries (services, manufacturing, transport, communication, public utilities, finance, construction, and mining). The increase in jobs is most marked in the service industries, which are labor-intensive. Jobs lost in retailing tobacco are likely to replaced by jobs retailing other products that people purchase with the money formerly spent on tobacco. As noted by Sunley *et al*. (Chapter 17), tax increases on tobacco products would increase revenues in the short to medium term.

In most studies net gains in activity would be realized in every broad economic sector, which suggests that, in general terms, the required degree of readjustment to the economy without tobacco would be limited. Most independent studies assume that income not spent on tobacco will be spent on other goods and services according to consumers' existing (average) expenditure patterns. Some studies (Buck *et al.* 1995; van der Merwe 1998a) have, however, tested alternative expenditure patterns following evidence that consumers' cessation of smoking leads to new spending patterns. For

Table 13.4 Independent studies on the contribution of tobacco to various countries' economies

Study	Dynamic or static model	Assumption of reduction or elimination of domestic consumption expenditures or production	Assumption of alternative expenditure patterns	Assumption of government reaction	Results
Quantitative studies					
Scotland (McNicoll and Boyle 1992)	Static	Elimination of domestic consumption expenditures in 1989.	According to 'average' expenditure patterns.	No change in government expenditure.	Net gain of 7869 jobs in 1989.
Michigan (Warner and Fulton 1994)	Dynamic	Scenarios: elimination of domestic consumption expenditures, and doubling the rate of decline in consumption over the period 1992–2005.	According to 'average' expenditure patterns.	Increases in other government taxes, and/or reduced government spending.	Net gain of 5600 jobs in 1992 up to an additional 1500 jobs by 2005.
United States (Warner *et al.* 1996)	Dynamic	Scenarios: elimination of domestic consumption expenditures, and doubling the rate of decline in consumption over the period 1993–2000.	According to 'average' expenditure patterns.	Increases in other government taxes, and/or reduced government spending.	Net gain of 47 jobs in 1993 and 133 000 jobs by 2000, 19 719 net jobs with doubling consumption decline.
United Kingdom (Buck *et al.* 1995)	Static	40% decline in domestic consumption expenditures in 1990.	Scenarios: according to 'recent stoppers', to non-smokers, all former smokers, and 'average' expenditure patterns.	Increases in other government taxes or reduced government spending.	Net gain of 155 542 jobs or 115 688 full-time equivalent jobs in 1990 with 'recent stopper' expenditures and government increasing other consumer taxes.
Canada (Irvine and Sims 1997)	Static	20% decline in domestic demand for cigarettes in 1995.	According to 'average' expenditure patterns.	Reduced government spending.	Net loss of 6120 jobs in 1995.

South Africa (van der Merwe 1998a)	Static	Scenarios: elimination of domestic consumption expenditures, and doubling the rate of decline in consumption in 1995.	Scenarios: according to 'recent stoppers', and 'average' expenditure patterns.	Increases in other government taxes, and/or reduced government spending.	Net gain of 50236 jobs in 1995 with elimination of tobacco and 'recent stopper' expenditures.
Zimbabwe (van der Merwe 1998b)	Static	Elimination of domestic consumption expenditures and all tobacco production in 1980.	Scenarios: according to 'average' input–output patterns and all production shifted to alternatives in agriculture.	No change in government expenditure.	Net loss of 87798 jobs in 1980 and 47463 jobs when all output goes to alternatives in agriculture.
Bangladesh (van der Merwe 1998c)	Static	Elimination of domestic consumption expenditures and all tobacco production for cigarettes and bidis in 1994.	According to 'average' expenditure patterns.	No change in government expenditure.	Net gain of 10989192 jobs in 1994.

Study	Assumptions	Conclusions
Qualitative studies		
Canada (Allen 1993)	1. Jobs could be subsumed through normal workforce attrition. 2. Technological changes caused many job losses. 3. Increased public revenues could be spent to maintain services and create jobs. 4. Cost savings in shifting Canadian production abroad. 5. Distribution jobs would remain. 6. Economy would self-correct.	Control policies, primarily taxes, would have negligible adverse effect on employment.
Pacific Islands (Collins and Lapsley 1997)	1. Alternative cash crops are likely available on islands that grow tobacco. 2. Freed expenditure resources directed to goods and services with higher labor content. 3. Improvement in balance of payments on current account from reduced tobacco imports.	Reduction in consumption would probably produce small increase in employment.

example, some studies assumed that former smokers would use their marginal increase in income, in the short-term, to increase expenditure on luxury items such as recreational goods and services, while expenditure on essential items such as housing would change very little (Buck *et al.* 1995). Studies in the United Kingdom and South Africa examining the expenditure of people who had recently quit smoking showed that they made increased use of labor-intensive services such as recreation, education, and communications (van der Merwe 1998d). If this behavior pattern were seen on a national scale, there would be larger structural adjustments and transition costs in the economy, but there would also be larger net gains.

The results also show that the tobacco-producing regions or countries, for example the south-eastern part of the United States, Zimbabwe, and Canada, would have suffered job losses (Warner *et al.* 1996; van der Merwe 1998b; Irvine and Sims 1997). However, in the United States (Warner *et al*. 1996), with every non-tobacco producing region enjoying a net gain in jobs, all non-tobacco regions collectively would have gained enough employment to offset the losses.

Most studies are also based on the use of input–output tables, which show the interdependencies between industrial sectors and sub-sectors in the economy (Miernyk 1957), and how the changes in one industry affect the level of output in other industries. This static approach usually compares two alternative situations in a given base year, one with and one without (or with reduced) tobacco expenditures taking place. Alternatively, dynamic models (Warner and Fulton 1994), allow one to simulate trade flows and feedback effects.

Even where it is assumed that a portion of the reallocated resources would go to saving rather than spending, the studies show that there could still be employment gains. If the money consumers once spent on tobacco were saved instead of spent, this would also be expected to generate jobs because of incremental investment demand, assuming people use their savings to acquire financial assets other than cash.

Finally, certain assumptions are made as to how governments may react to a possible loss in revenue from a fall in consumption in the long run. These usually include alternatives such as reduced government expenditure, and hence employment (Allen 1993) or the collection of consumer taxes on alternative goods and services (Warner *et al.* 1996). If the fall in consumption is brought about not by excise taxes, but by other regulatory actions such as an advertising ban, then consumers would have the additional money to spend on goods and services besides cigarettes. Alternatively, if the fall in consumption is brought about by tax increases, then new jobs will also be created, as long as the government spends the additional tax revenues. Even in the unlikely case of governments using all extra income for deficit reduction, reduced interest rates would result in increased employment. Taken together, the evidence suggests that the economy, at a macro-level, can respond to the decline in cigarette consumption by generating at least as many jobs in other industries as were lost in tobacco growing or manufacturing (Allen 1993). As others (Chapter 17) show, tax increases on cigarettes would cause an increase in government revenues in the short- to medium-term. In the long run, excise tax revenues may be reduced as a result of lower consumption levels. Any reduction in revenue would either need to be replaced from other sources, or could alternatively also result in employment loss in government. It might be assumed that government would react to the loss in revenue in this transition by

increasing taxes from other goods and services. This would naturally occur as consumer expenditure switched to other goods and taxes were collected on these items. The studies therefore usually test one or more ways in which government may react to possible long-run revenue losses, usually including the assumption that a natural shift to alternative tax bases will take place (Allen 1993).

Finally, these studies estimate dramatic declines in tobacco use, or even its complete elimination. In reality, however, there is little prospect of a sharp and sudden reduction in tobacco production. If demand for tobacco falls, it will fall slowly. Others in this volume describe how control policies such as taxes (Chapter 10) and information (Chapter 8) yield modest but gradual reductions in demand. This allows for an equally slow process of transition for those most directly affected. For example, total cigarette sales have fallen in the United Kingdom from 138 billion to 50 billion over three decades (Nicolaides-Bouman *et al.* 1990). Similarly, in the United States, the decline in smoking prevalence among men has taken place over three decades (USDHHS 1989). This means that the costs of adjusting supply as demand diminishes will also be stretched out over decades. Thus, the transition costs would also be spread over a long period.

13.3.3 The impact of control policies on trade in tobacco

In principle, control policies will have both negative and positive economic impacts on trade in tobacco, particularly with respect to jobs. However, employment losses are expected to be greater for countries that are net exporters of *unprocessed or total tobacco* (Table 13.5), than for countries that are net exporters of *cigarettes* (Table 13.6). We focus on trade in unprocessed and total tobacco below.

Countries may be divided into five possible generic categories with respect to tobacco production:

(1) the country produces but does not consume tobacco, making it a *full exporter*;
(2) the country produces more tobacco than it consumes; in other words it is a *net exporter*;
(3) the country produces and consumes the same amount of tobacco—this is a case of a '*self-contained*' industry with respect to tobacco;
(4) the country produces less than it consumes, in other words it is a *net importer*;
(5) the country does not produce tobacco but consumes it, in other words it is a *full importer* of the product.

The impact of control measures would differ in each of these categories. Countries in Category 1 are a theoretical possibility but in practice rare. Zimbabwe would probably be the country closest to this, where in 1996, 99% of tobacco production went for export (Maravanyika 1997). Most countries fall into Categories 2–4. In general, as one moves from Category 5 through to Category 1, the transition costs of tobacco control rise. For instance, for a full importer economy, there would be no production loss (or associated employment loss) even if demand fell dramatically. The full burden of transition would fall on the consumption side and its related elements, including import taxes, sales taxes, and trade-related employment. In general, countries that are net importers would be less affected by control policies than net exporters. There are only

Table 13.5 Net exporters and net importers of tobacco, 1995

Income	Net exporters Category 1 and 2	'Self-contained' Category 3	Net importers Category 4 and 5	
Low-income	India Kenya Malawi Tanzania Zimbabwe	China Pakistan Sri Lanka Zambia	Bangladesh Bosnia and Herzegovina Cote d'Ivoire	Nepal Nigeria Vietnam
Lower middle-income	Colombia Guatemala Macedonia Thailand Turkey	Bulgaria Egypt Philippines	Algeria Bolivia Botswana Estonia Indonesia Iraq Kazakhstan Lithuania Morocco	Papua New Guinea Peru Poland Romania Russia Slovakia South Korea Ukraine Venezuela
Upper middle-income	Argentina Brazil Chile Greece Mexico	South Africa	Croatia Czech Rep. Hungary Malaysia Saudi Arabia Slovenia	
High-income	Canada Italy United States	United Arab Emirates	Australia Austria Belgium Luxembourg Cyprus Denmark Finland France Germany Hong Kong Ireland Israel	Japan Netherlands New Zealand Norway Portugal Qatar Singapore Spain Sweden Switzerland United Kingdom

Source: Market File (1998); UNIDO (1998); World Bank (1997).

a few major producers and exporters of tobacco that fall into Category 2. They include: the United States, Canada, India, Brazil, Zimbabwe, Turkey, and Malawi. These major producers and net exporters, as shown in Table 13.5, would have higher transition costs if global demand falls.

Even in net exporting countries, control policies that reduce *domestic* tobacco consumption will have negligible effects on output in the economy and employment. Only when the control policies directly impact on their export markets do they face poss-

Table 13.6 Net exporters and net importers of cigarettes, 1995

Income	Net exporters Category 1 and 2	'Self-contained' Category 3	Net importers Category 4 and 5
Low-income			Afghanistan Albania Myanmar
Lower middle-income	Bolivia Venezuela	Slovakia	Iran Lebanon Paraguay
Upper middle-income	Croatia Hungary	Czech Rep. Greece Malaysia	
High-income	Austria Denmark Finland Germany Ireland Netherlands Switzerland United Kingdom	Australia Cyprus Hong Kong New Zealand Singapore	Guam Iceland Kuwait Macao

Source: Market File (1998); UNIDO (1998); World Bank (1997).

ible job losses. In addition, these countries would be the hardest hit by attempts to restrict global supply, or supply from these countries. For example, bans on importing tobacco from these countries would yield significant short-term job losses, particularly in Zimbabwe and Malawi.

Several of the countries that appear in Categories 1 and 2 are not major exporters or producers of tobacco, and hence control policies would have smaller repercussions in their economies. In fact, many countries, particularly in Europe, import tobacco leaf and are then exporters of manufactured cigarettes. Control policies will thus affect their manufacturing industries, which generally employ fewer people than the primary production side, and are less labor-intensive.

The number of countries falling into Category 3—neither net importers nor net exporters—is also relatively limited. A few prominent members, some already shown in Table 13.5, are China, the Philippines, Pakistan, Bulgaria, and South Africa. The 'self-contained' category would expect to see no job losses or modest gains with reduced demand. For example, studies in South Africa and Scotland concluded that there would be a net increase in employment (Table 13.4).

Generally, the elimination of the tobacco industry in net importer countries is expected to create jobs overall. One study in Bangladesh, a net importer, found increases in employment with reduced demand (van der Merwe 1998b). In addition, a reduction in imports should also improve the trade balance and have positive

economic effects through reduced foreign exchange losses (Collins and Lapsley 1997). It should be noted that Tables 13.5 and 13.6 are based on 1995 data and that, over time, some categorization shifts may take place.

13.3.4 Industry-generated employment losses

Often overlooked in the debate over tobacco control and jobs is the fact that several countries have simultaneously increased tobacco production and decreased employment in tobacco manufacturing. This is a consequence of productivity improvements and technological changes rather than imposed tobacco-control policies (Connolly 1992).

A study in the United Kingdom (PEIDA 1991) showed that much of the employment loss in manufacturing between 1980 and 1990 was due to productivity improvements. In the United States, manufacturing jobs fell by 29% between 1982 and 1992, despite the fact that US cigarette output actually increased during that period due to increased exports (Allen 1993). In Colombia, output increased by 26% over the first half of the 1980s, yet the number of jobs dropped by 25% to 2973 in 1985. Similarly, in Spain in the 1980s, output increased by 14% and employment fell over the same period, by 14% to 10 200 in 1986. In Malaysia, output increased by 15% in the 1980s and tobacco manufacturing employment fell over the same period by 62% to 4300 in 1987. In Pakistan, output increased 23% and employment fell 8% over the same period in the 1980s. Similarly in the Philippines, production increased in the 1980s by 17% and employment over the same period fell by 28% to 13 000 by 1987 (UNIDO 1998).

Finally, domestic sales of US leaf tobacco have fallen over the past several years despite the increase in domestic cigarette production. This decline in demand, and the corresponding drop in tobacco farm employment, is due primarily to increasing reliance by major manufacturers on imported tobacco (Arthur Andersen Economic Consulting 1993).

We now turn to a discussion of the incentives to grow tobacco, and review the role of supply-side interventions such as subsidies, diversification, buy-outs or bans on production.

13.4 The effectiveness of supply-side instruments such as subsidies and tobacco farm diversification

While tobacco growers account for a small share of the total income generated by the tobacco industry, they are a key source of opposition to tobacco control. Therefore, knowledge of the incentives to grow tobacco, and the operation of world tobacco markets, are critical to the design of workable tobacco control policy and strategies.

13.4.1 The incentives for producing tobacco

The chief incentive for tobacco farming is that it is more profitable than many other crops. In the United States, for example, net returns of roughly US$2000 per acre of

tobacco far exceed the net returns from most other crops (Gale *et al.* in press). In Zimbabwe, tobacco is roughly six times more profitable than the next-best alternative crop (Maravanyika 1997). An industry-sponsored study that attempted to identify alternative crops and compare their returns with those of tobacco in seven developing countries concluded that there are few profitable, sustainable alternatives to tobacco production that could be widely adopted (ITGA 1996b). For many people who grow tobacco in developing countries, tobacco is their only cash crop, and these people are often poor. Tobacco growers in high-income countries are not poor by the standards of Africa or South Asia, but they tend to be concentrated in relatively impoverished regions of their countries.

The indirect benefits of tobacco cultivation to farmers are also considerable. Tobacco cash income enables the purchase of farm equipment and household goods, and supports other farm enterprises, including food crops that are consumed by the household. In the Philippines, tobacco is grown as a dry-season crop, while palay is grown in the wet season (Ernst and Young 1991). In some developing countries, tobacco production has generated improvement in farming practices that not only increase tobacco yields but also increase the production of other crops (Maravanyika 1998). For example, Zimbabwean tobacco farmers also produce large proportions of the country's maize, cotton, beef, wheat, and soybeans (Chapman and Wong 1990). In Malawi, the tobacco crop finances the bulk of marketed maize and virtually all paprika production. In Ghana and India, it was found that farmers who grew tobacco were more likely to use improved, modern technology in producing their non-tobacco crops. In addition, the cultivation of tobacco may attract investment by multinational companies in low-income or middle-income countries, thus raising overall income levels (Lewit 1987).

In contrast to developing countries, tobacco farmers in high-income countries usually have other cash-generating farm enterprises, though tobacco generates most of the net returns to the farm. However, many, if not most, tobacco-farming families in these countries do not rely solely on farm income (Gale 1998). Off-farm work provides the bulk of income for many tobacco-growing households. In the United States, farms that produce flue-cured tobacco are likely to grow soybeans, corn, cotton, and wheat as well. On smaller US farms typical of burley tobacco, beef cattle are common.

13.4.2 Taxation of tobacco producers in low- and middle-income countries

Many low-income countries rely on revenue from export taxes and industry excise taxes, since income taxes are difficult to administer without an adequate infrastructure (Pena and Norton 1993; Beghin *et al.* 1996). Argentina, Brazil, Turkey, and recently Zimbabwe all have export taxes on tobacco products. In low-income and middle-income countries, marketing boards or state-approved tobacco monopolies often purchase tobacco leaf at low prices, indirectly taxing tobacco growers. In some countries, governments try to offset these taxes with subsidies for credit, electricity, and other production inputs. Other ways of extracting revenue from tobacco include over-valued exchange rates. The taxation of producers discourages tobacco production by pushing

land, labor, and capital out of tobacco production into other types of farming, urban non-farm employment, work in the informal sector, or unemployment. However, despite the taxation, tobacco is still more profitable than available alternatives in most countries where it is grown. Where alternatives to tobacco are poor, producer taxation can succeed in raising revenue since growers cannot respond to lower returns to tobacco (or farming in general) by switching to other activities. In such a situation, governments have incentives to encourage tobacco production. Peng (1996) describes how a lack of economic development and a poorly functioning tax system in the transition to a decentralized economy created fiscal dependence on tobacco in a poor region of China. Peng goes on to describe how local governments may pressurize farmers to plant tobacco in order to increase tobacco tax revenue.

13.4.3 Subsidies, quotas and supply control

In the high-income countries, stagnant or falling domestic demand, pessimistic pronouncements about the future of tobacco farming, attractive non-farm opportunities, and rising farm productivity have contributed to a slow, but substantial, movement of people out of all types of farming, including tobacco (Gale 1998). The number of tobacco farms in the United States and Canada fell by nearly two-thirds from the early 1960s to the 1990s. However, structural adjustments would have been even more dramatic without the incentives provided by tobacco subsidies, which have preserved the structure of small farms and prevented regional shifts in production (Sumner and Alston 1985; Industry Commission 1994; Brown 1998).

Governments in many countries have introduced price supports, subsidies or credit for fuel and transport, export subsidies, marketing programs, and national or regional policies that benefit the sector. These policies increase the profitability of tobacco and induce farmers to plant tobacco that would not otherwise be grown (Beghin *et al.* 1996). In high-income countries, tobacco price supports were introduced for two reasons. First, there were concerns that tobacco prices are not set by free markets, because cigarette manufacturers are few in number and it is believed that they have power to set prices that are disadvantageous to farmers. Second, there were concerns about potential instability in the tobacco markets, and resulting uncertainty in prices from year to year, due to weather, disasters, overplanting, or other economic fluctuations. Therefore, unlike many other cash crops, the producer price of tobacco does not fluctuate substantially. Growers negotiate sales prices in advance of planting so they are protected from unexpected price changes and they are paid in cash immediately upon sale of the crop. Therefore much of the risk of tobacco growing is shifted from the farmer to the purchaser (Lewit 1987). Even though in the United States, many of the reasons for implementing the initial price supports are no longer valid, the federal government still maintains the program mainly for political reasons (Tweeten 1995).

Governments in several high-income countries set prices above world market levels, while restraining production through supply controls. In the United States, Canada and Western Europe, governments set minimum prices for each type of tobacco, based largely on the costs of producing it, which are significantly higher than prices in world markets (Coady *et al.* 1991; Joossens and Raw 1996; Irvine and Sims 1997). These high,

stable prices would draw resources into tobacco production (or prevent them from exiting). But these price support schemes also include strict quotas on production and marketing that limit the quantity grown. Tobacco growing is limited to those possessing production rights assigned by the government (acreage allotments and marketing quotas). Due to these limitations on supply, production levels are lower than would occur in an unregulated market (Sumner and Alston 1985; Brown 1998). Informal estimates indicate that flue-cured tobacco production might be tripled if quotas were not in place. Therefore, the United States's tobacco subsidy reduces the US share of the world tobacco market, despite the incentive to produce provided by high prices. Nevertheless, US tobacco has maintained a large world market share due to its high quality. High prices have not only reduced foreign demand, but have also encouraged US cigarette manufacturers to increase their use of cheaper foreign tobacco. Some European countries have also restrained production through quotas, but historically European subsidies have encouraged the production of low-quality/high-tar tobacco varieties that are not in demand in their own markets. Much of this European tobacco was exported, often with the help of export subsidies, to Central and Eastern Europe and the Middle East, while most tobacco used in European cigarette manufactures was imported (Townsend 1991; Joossens and Raw 1996). Some of the larger tobacco-producing countries that give subsidies for tobacco growing include Argentina, Bulgaria, Columbia, Germany, Greece, Italy, Spain, Turkey, and also Brazil, Hungary, and Uruguay, which have general agricultural subsidy programs that include tobacco.

These price supports introduce certain distortions in the market. In particular, quotas and allotments make tobacco growing more profitable to the farmer (or allotment holder) than it would be if market forces determined prices. This encourages a shift of resources from other crops to tobacco. In competitive markets, this resource shift leads to an expansion of supply and an equilibrating fall in price. Where supply is controlled, price does not fall and as a result excess profits, called 'economic rents', are created, which make the government-assigned right to produce and sell tobacco a valuable asset. Excess profits encourage producers to organize politically to protect their rents against falling prices, imports, and government tobacco-control policies designed to decrease demand. Such 'rent-seeking' behavior could be considered a likely consequence of regulatory and subsidy policies (Lewit 1987).

Tobacco is far from unique among various agricultural markets in having a history of supply controls and quotas. These systems were created largely before the health effects of tobacco were understood. Now, however, the protection of economic rents has motivated growers to unite in opposition to tobacco control efforts. In the United States, transferability of production quotas has created a class of 300 000 quota owners, many of whom rent out their quota and do not grow tobacco themselves. This large number of individuals, each with a small stake in maintaining the tobacco subsidy, further strengthens opposition to its elimination (Warner 1988).

Tobacco subsidies have often been criticized as a form of government hypocrisy. A common public perception is that tobacco subsidies directly encourage smoking by encouraging tobacco cultivation. More recently, however, it has become more widely recognized that the reality is more complex. In high-income countries, subsidy schemes may actually discourage consumption slightly by restricting the amount of leaf

produced and thus raising the price. Higher tobacco prices raise the cost of cigarettes, thus discouraging smoking. But the effect is small since tobacco leaf accounts for less than 5% of retail cigarette prices (Zhang and Husten 1998) and prices in high-income countries are primarily determined by taxation.

In order to conserve foreign exchange, many low-income and middle-income countries may attempt to discourage imports of both tobacco leaf and cigarettes, particularly if the countries have domestic tobacco industries. Imports are discouraged by restricting the availability of foreign exchange for tobacco imports, and by differential taxation. These interventions result in substantial price differences between domestically-produced cigarettes that contain foreign tobacco and those that do not. As a result of import duties and other import restrictions, prices received by tobacco growers in these countries are likely to be higher than they would be otherwise, because domestic production is stimulated and tobacco farmers' incomes increased (Lewit 1987).

Tobacco production for farmers may, therefore, appear to be desirable because it allows participation in a subsidized market. In addition, policies within low-income and middle-income countries that limit tobacco imports also benefit domestic producers at the expense of consumers. Accordingly, the subsidies may cause policy-makers and farmers to mis-value the crop. In the short-run, therefore, tobacco production may prove very profitable and raise national incomes in low-income and middle-income countries. However, it will induce self-protective behavior by its participants, which may make it very difficult for governments to mount effective programs for control of tobacco use.

13.4.4 Tobacco-farm diversification

There is much discussion of tobacco-farm 'diversification' or 'crop substitution', which entails farmers switching from tobacco to other crops (Aberg and Tedla 1979; Al-Sadat and Zain 1997; Altman *et al*. 1998). Such supply-side efforts, often driven by a desire to move production toward crops with less negative health implications, are not likely to be effective as a means of controlling tobacco use. A basic observation in markets is that, if one supplier of a commodity is prevented from operating, another will quickly emerge to take its place, as long as there is a strong incentive to do so. 'Diversification' is actually a misnomer since, as discussed above, most tobacco-growing households are already quite diversified. In countries of all income levels, however, tobacco usually provides an important share of cash income (Lewit 1987).

Large-scale efforts to encourage tobacco farmers to diversify and substitute alternative crops have occurred in only a few countries. In the United States, farmers have expended considerable effort in searching for alternatives to tobacco, motivated in part by the US market's uncertain prospects. A recent survey of US tobacco farmers showed that 70% had attempted supplemental enterprises in the previous five years (Altman *et al*. 1996). Efforts, however, have been scattered and piecemeal, and farmers have not been offered financial incentives to switch crops. There have been attempts to grow familiar crops like broccoli, as well as more exotic enterprises, such as llamas and ginseng. Several alternative crop programs could succeed. Labor-intensive speciality crops and value-added activities are viewed as the most promising alternatives, pri-

Table 13.7 Economic returns of alternative crops to flue-cured Virginia tobacco in India, 1989

Crop	Yield (kg/ha)	Cost of cultivation (Rs./ha)	Gross income (Rs./ha)	Cost–benefit ratio
Safflower	1800	3661	14400	1:4.0
Mustard	1500	3196	12000	1:3.3
Flue-cured Virginia tobacco	1417	8464	17620	1:2.0

Source: Chari and Kameswara Rao (1992).

marily fruit, vegetables, tree crops, and flowers. In the United States, farmers and agricultural specialists are exploring Asian vegetables, greenhouse crops, organic vegetable production, aquaculture, and on-farm recreation.

For developing countries, a number of alternative crops have also been identified. These include cassava in Brazil, sugar cane in Kenya, and chillies, soya beans, cotton, and mustard in India. Rose blooms have been identified as a more profitable alternative to tobacco in Zimbabwe, but obstacles to adoption include the large net investment, a lack of cashflow in initial years, and transportation problems in getting fresh flowers to markets in Western Europe (Maravanyika 1998). Eggplant has been recommended as an alternative or supplemental crop in the Philippines (Campos and Alejandro 1994). Yach (1996) reported that, worldwide, more than 50 alternative crops and land uses for tobacco have been identified, but acknowledged that several obstacles prevented implementation.

When examined on a cost–benefit basis, tobacco may not always ultimately produce the best economic returns, as shown in India in Table 13.7. The highest gross revenue per acre is not always synonymous with highest returns to labor. Moreover, tobacco farming is labor-intensive with high labor costs that reduce the net returns to land. Therefore, with higher cultivation and labor costs in tobacco, alternative crops can sometimes yield greater cost-benefit ratios, despite earning a lower gross income. Table 13.7 shows returns from tobacco and non-tobacco crops from one study in India.

One important barrier for farmers contemplating a switch of crop may be a lack of credit with which to purchase new seeds or other inputs. In many countries, tobacco growers obtain production loans from processors or marketing boards that are repaid when the tobacco crop is sold. Strong logistical support offered by the tobacco industry with technical advice and packages that include seeds, fertilisers, and pesticides, comes with the production loans. In some cases the loans are sufficiently large that small farmers may be unable to repay them (Kweyuh 1998). Another problem is an apparent lack of markets for tobacco alternatives. Other crops often suffer from post-harvest perishability in delivery, where tobacco is generally drought-resistant and its storability can reduce year-to-year fluctuations in prices.

The available evidence suggests that diversification plans are more likely to succeed

if their impact on all relevant markets has been carefully considered. Some speciality crops are able to provide competitive returns for a few farms, but widespread adoption would drive prices down, thus eliminating any profitability advantage. For example, in the United States, there are relatively few vegetable growers in tobacco-growing areas. A large increase in production resulting from tobacco farmers entering the vegetable market would have a large downward impact on vegetable prices, with negative effects on current vegetable growers as well as diversifying tobacco farmers. Careful market analysis must also be conducted before recommending substitutes for tobacco (Ernst and Young 1991). The analysis must consider the size of the potential market (domestically and overseas), elasticity of demand (sensitivity of price changes to quantity), inter-regional and international competition, and the relative advantage of the tobacco-growing region (in terms of production costs, soils, and access to markets) compared with competing regions.

Diversification should be viewed as a broad process, with crop substitution being only one component of the whole (see Box 13.1). Analyses suggest that diversification programs have a greater chance of success if they are designed in terms of broad economic development in tobacco-growing areas to provide non-farm employment opportunities, sources of tax revenue, and foreign exchange. A non-farm job may be the best alternative to tobacco growing in many places, as suggested by Table 13.2. Rural economic development, including value-added enterprises, should be encouraged in order to provide additional job opportunities. This may require investment in transportation and other infrastructure, education and job training, and access to credit for small businesses (Altman *et al*. 1998).

Farmers are likely to need compensation and assistance to make the transition to other crops, retirement, or non-farm employment. Informational databases that include soil characteristics, topography, rainfall patterns, field size configurations, machinery complements, and any requirement for managerial expertise, would help farmers to evaluate the prospects for successful adoption of alternatives. Geographic information systems could also be used to identify suitable areas for various alternatives (Bonoan 1994).

Box 13.1 Help for poorer farmers in tobacco production

An accurate assessment of the way in which gradually falling demand will affect tobacco-farming communities is clearly critical for policymakers. Studies in most high-income countries suggest that the economies of these countries' tobacco-growing are already diversified. A survey of tobacco farmers in the United States indicates, for example, that half of those questioned were at least aware of profitable alternative agricultural activities (Altman *et al.* 1998). Younger and more educated farmers were more likely than older farmers to be interested in diversification and would see fewer obstacles. Likewise, a sizeable minority of farmers questioned in the survey were aware of the prospect of change, but recognized that it would be slow. Although more than eight

out of ten said that they personally expected to remain in tobacco farming, one in three said they would advise their children not to remain in the same business.

Farmers have invested considerable amounts of time and effort in gaining knowledge and skill in growing tobacco. Learning to grow and market a new crop, perform a non-farm job, or operate a business requires new capital, knowledge, and experience for success. For many older farmers, such investments are not worthwhile, since they have relatively few working years remaining in their life-cycle to recoup the investment of time and financial resources needed to succeed in an alternative activity. Older farmers also have the highest economic rents in tobacco production and, therefore, the highest opportunity costs in switching to alternatives. For this reason, shifting from farming to other sectors is usually undertaken by younger generations entering alternative occupations. Younger tobacco farm operators are also more inclined to experiment with on-farm alternatives to tobacco and are less likely to report lack of skills as a barrier to engaging in other activities (Altman *et al.* 1996). Movement of people out of tobacco production requires investments in education and development of skills that will equip members of younger generations to seek alternative opportunities to tobacco and this investment necessarily has a long payback period.

The education of farmers about the hazards of smoking and availability of alternative crops may have some impact on decisions to grow tobacco, but most farmers are likely to continue growing tobacco as long as it is more profitable than other activities and demand is there. Setting prices that reflect the true marginal social costs of allocating resources to tobacco production is difficult and complex, considering the complexity of tobacco policy and variability from one country to the next (Zhang and Husten 1998).

Nonetheless, there are several reasons why governments would want to provide assistance to meet the transition costs for their poorest farmers. Farms are a major source of rural employment, and often are viewed as socially important by many societies. In addition, farmers can represent significant political opposition to tobacco control. Appropriate action for governments would involve a number of different efforts, such as encouraging sound agricultural and trade policies, the provision of broad rural development programs, assistance with crop diversification, rural training, and other 'safety-net' systems. Some governments have proposed that such support could be financed out of tobacco taxes. Governments may also learn from the success of local efforts. In the United States, for instance, some rural communities that are traditionally dependent on tobacco have formed coalitions with public health constituencies to agree core principles for policies that will reduce tobacco consumption and also promote sustainable rural communities (Altman *et al.* 1998).

13.4.5 Inducements to leave tobacco farming

Since tobacco provides much higher returns than alternative crops, farmers would require some financial inducement to switch crops. However, such inducements would be costly and are unlikely to be effective in reducing demand. High buy-out costs reflect the high-opportunity cost attached to switching to an alternative use of productive resources that are currently deployed for tobacco production in countries such as Malawi, Zimbabwe, and China.

A few governments have offered, or have proposed offering, farmers inducements to leave tobacco farming, but none have clearly succeeded in significantly cutting tobacco production. Canada's Tobacco Diversification Plan provided incentives to stop growing tobacco and develop alternatives to assist the orderly downsizing of the Canadian tobacco industry in the 1980s (PAHO 1992). Significant numbers of farmers ceased production through this program, but many participants acknowledged that they would have quit tobacco farming without it. The program's success is further qualified by the finding that 24% of participants continued to work in tobacco farming as employees, rather than as entrepreneurs. Australia eliminated production subsidies, domestic content rules for cigarette manufactures, and lowered tariffs, while at the same time offering a buy-out of tobacco quotas (Australian Financial Review 1998). As a result of the Australian deregulation and buy-out, many growers left the tobacco sector, but they tended to be less-efficient producers of low-grade leaf; those remaining tended to expand the scale of their operations to increase efficiency. In the United States, officials drafting comprehensive tobacco legislation in 1997 and 1998 discussed a buy-out quota of US$ 8 per pound of tobacco payments to tenant farmers, as well as job training, education, and rural development grants. However, nothing was enacted at that time. The US proposals involved buying out the government-assigned right to produce for subsidies, not the right to grow tobacco at all. Because the buy-out would also lift production quotas, a US buy-out could actually result in greater production of flue-cured tobacco and little change in burley production.

If a buy-out or other scheme were successful in reducing production in a particular country or region, there will be little effect on the world supply of tobacco. As Fig. 13.2 demonstrates, world production is already shifting to lower income countries. Developed countries have restricted their production (albeit for producer-welfare rather than tobacco-control objectives) over the last several decades. At the same time, developing countries have rapidly expanded production to fill the void and meet world demand, so that world production has continued to grow. It is likely that new buy-out policies would merely create huge profits for other tobacco suppliers, and a rapid increase in 'replacement' production.

13.4.6 Outright bans on tobacco production

Given tobacco's unprecedented capacity to damage health, some public health advocates have called for it to be prohibited, arguing that the problem of tobacco is not in its consumption, but its production (Beaglehole and Bonita 1997). Advocates of tobacco prohibition point to the marked reduction in alcohol-related diseases when alcohol supply was restricted earlier in the twentieth century. For example, when

alcohol supplies were restricted during the Second World War, alcohol consumption in Paris fell by 80% per capita. Deaths from liver disease in men were halved within one year, and fell by four-fifths after five years. After the war ended, mortality from liver disease returned to pre-war levels. Restrictions during the US prohibition were less effective, and prohibition did not significantly stem alcohol use or abuse; indeed, it created its own problems (Berkelman and Buehler 1990).

However, the prohibition of tobacco is unlikely to be either feasible or effective, for a number of reasons. First, even when substances are prohibited, they continue to be widely used, as is the case with many illicit drugs. Second, prohibition creates its own sets of problems: it is likely to increase criminal activity and entail costly police enforcement. Third, the prohibition of tobacco is unlikely to be politically acceptable in most countries. In India, recent attempts to ban a chewed type of tobacco known as *gutka* failed, largely for political reasons (George 1998). Fourth, from an economic (as opposed to public health) perspective, optimal consumption is not zero, given that some fully informed adults would still be interested in smoking (Chapter 7; Pekurinen 1991). Finally, as noted above, drastic supply reductions would lead to significant welfare losses for the poorest farmers in countries highly dependent on tobacco as a source of cash income.

Additional lessons can be taken from experience in some of the draconian attempts to control the supply of illicit narcotics through eradication of crops such as coca, hemp, and opium poppies. Eradication efforts reduce the total area under cultivation, but do not eliminate production completely. Attempts to promote adoption of alternative crops have been unsuccessful, due largely to the profitability of growing illicit crops. Outlawing crops raises the cost of production by forcing production into less accessible areas and raises marginal returns to compensate producers for greater risks of incurring penalties, other sanctions, or having crops destroyed by law enforcement officials. By raising marginal returns and pushing production into less-accessible areas where alternative opportunities are poor, the difference in income between growing illicit crops and alternatives becomes even more pronounced, making crop substitution more unlikely. There have been attempts to accompany crop eradication with promotion of alternative crops and rural development efforts, but these have been hampered by lack of technical assistance to advise farmers growing the new crops, expense of administration (Crooker 1988; Crooker and Martin 1992), and lack of long-term commitment.

13.4.7 The impact of lower producer prices

Overall, because economic incentives remain strong for supplying tobacco as long as demand persists, it is unlikely that most supply-side interventions will be effective at reducing consumption. In fact, the key factor that would tend to lower the tobacco supply would be lower producer prices, translating to a lower incentive to grow tobacco. Tax increases, which already determine much of the retail price of cigarettes, would be used to offset any marginal decrease in retail price from lower producer prices.

The trend since 1960 has indeed been a slow eroding of the world tobacco price, such that for the period 1960–89 the world price for flue-cured tobacco declined in real

terms between 1.1% and 1.7% per year. Thus, while the nominal price of tobacco is expected to increase from the 1985 base year of US$1950 per ton to US$2521 per ton by 2000, the real value will decline to about US$1221 (World Bank 1992). However, tobacco prices have been more stable than many other agricultural commodities over the 10-year period prior to 1993, which is why tobacco remains a popular crop. Tobacco prices declined by 29% between 1985 and 1993. However, real prices of most agricultural and other basic commodities have fallen even more in recent years (ITGA 1996c). Thus, growers have little incentive to switch to alternatives.

As noted above, it is not clear how the removal of price supports and subsidies would affect global price. Higher domestic prices in the United States may help to raise the global price of raw tobacco leaf, offering better returns to farmers in low-income countries. On the other hand, there would be mixed effects for farmers in low-income countries if both subsidies and trade restrictions were removed. If, for example, the price of domestically produced tobacco in the United States were to fall because of the removal of subsidies, cigarette manufacturers there might use more of it, in turn reducing their imports of lower quality imports from low-income countries. But at the same time, with freer trade, imports of such tobacco could increase. Regardless of their minimal impact on consumption, price supports and subsidies for most agricultural products make little sense in a framework of sound agricultural and trade policies (World Bank 1991). Rather than attempts to influence global price through supply-side measures, gradual reductions in the number of farmers are far more likely to occur with falling demand and hence lower producers' prices. It is unlikely that such falling demand could be augmented with even more extensive supply-side efforts.

13.5 Conclusions and research priorities

This examination leads to some fundamental conclusions. First, in the majority of countries, and in the medium- and long-run, even very stringent tobacco-control policies would be expected to have minimal negative impact on long-run GNP, employment, tax revenue, and the foreign trade balance, as expenditure switches and reallocations in the economy take place.

Second, a country's reliance on tobacco exports and its stage of development are key factors in determining the economic consequences for its economy of tobacco-control measures. For the majority of countries that import and consume, or produce and consume, tobacco in a self-sufficient way, policies that reduce their demand for tobacco will probably have little or no net impact on the jobs, revenues, and on the trade balance (which may, in fact, improve by reducing tobacco imports). In many countries, there will be macro-economic benefits to reducing tobacco use. For the few countries that export tobacco and are not diversified in their economies, falling tobacco demand globally would result in some income and employment losses, particularly among farmers. Domestic tobacco control efforts in these countries, however, would have little or no impact. Effects would be greatest for the few countries that earn a significant share of foreign earnings from tobacco (chiefly Malawi and Zimbabwe).

Third, though some sectors will experience economic losses, realistic reductions in

tobacco demand will take place very gradually. Thus supply-side responses to lower demand will also be very gradual, reducing transition costs.

Fourth, as long as global demand continues, supply-side policies such as crop diversification or buy-outs result in very limited or zero reductions in the supply of tobacco. Specific diversification programs, placed within broader development programs, can help to meet the transition costs of poorest farmers in low-income countries that are now substantially dependent on tobacco production

Thus, this chapter concludes that the global supply of tobacco is most likely to fall if demand for tobacco falls, rather than as a result of supply-side interventions. Reductions in the world price of tobacco and in subsidies, price supports, quotas, and other supply-control measures, may reduce tobacco production to some extent. Elimination of the tobacco subsidy and other controls will cause a modest decline in the price of tobacco leaf, and—assuming no offsetting tax increases—a small decrease in the cigarette retail price. However, removal of such subsidies is justified on the basis of sound agricultural and trade policy.

Research priorities for the future include continued research into the macro-economic effects of tobacco-control policies at individual country levels, stakeholder analyses at the country level, and an assessment of the transitional costs from reduced tobacco production. Basic data requirements in many developing countries are paramount and include employment data, output data, and cost data with a rudimentary assessment of the producer surplus in producing countries. Continued investment in the search for viable alternatives for the tobacco crop at a country and regional level also remains important.

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