Tobacco - Marketing

AN ECONOMIC APPRAISAL OF THE MARKET FOR ONTARIO FLUE-CURED TOBACCO

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PREFACE

Four producer marketing boards in Ontario directly regulate the supply of commodities to be marketed -- milk, tobacco, broilers and turkeys. Other boards are considering similar action (e.g. the Ontario Egg and Fowl Marketing Board). Further, the most compelling reason for the proposed enabling legislation for national marketing boards in Canada appears to be that it would enable commodity groups to practice some forms of supply control.

Analyses of marketing board programs which evaluate the impact of supply control on groups, other than producers directly involved, have been rare. Marketing boards (and their programs) function through explicit government sanction, and therefore, it is essential that policy decision-makers be aware of the costs and benefits of a board's program to all members of our society. This study presents a general analytical format for the evaluation of the economic aspects of a supply control program using the Ontario Flue-Cured Tobacco Growers' Marketing Board as an example.

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HIGHLIGHTS OF THE STUDY

The objectives of this study were to examine the emerging demand prospects for Ontario flue-cured tobacco both domestically and abroad and to analyze the impact of the industry's supply control program in order to provide and evaluate alternative policy strategies for the Tobacco Board.

Flue-cured tobacco is a $130 million industry in Ontario providing a large portion of the farm income of Southwestern Ontario and the agricultural export earnings of Canada. Exports comprise 30 percent of Canadian tobacco sales, with the U.K. absorbing up to 90 percent. Production of Ontario tobacco is regulated through acreage allotments and auction markets by the Ontario Flue-Cured Tobacco Growers' Marketing Board.

The 1966 unilateral declaration of independence by Rhodesia and the resulting trade sanctions imposed by the U.K. substantially altered the patterns of world tobacco trade. As a result, Canada has been able to simultaneous expand exports and increase price. However, the expectation of Rhodesian restoration of trade with the U.K., the increased competitiveness of the U.K. market from the emergence of many small exporters, the changes in trade preferences, taxation policies and other elements associated with the U.K. entry into the community of 10, and the anticipated decline in the U.K.'s flue-cured tobacco consumption are a substantial accumulation of adverse factors creating a rather dismal prospect for our major export market. Meanwhile the EEC is expected to expand tobacco production and is likely to substitute flue-cured for other types of tobacco which have been given more favourable market access conditions. The culmination of these events suggests that world tobacco prices are likely to decline, a reversal of the trend during the late 1960's.

The domestic Canadian tobacco market is protected against imports by a 20-30 cent per pound tariff. The level of consumption in this market is quite insensitive to price changes at the grower level, and is expected to grow only as fast as adult population. Ontario has consistently been on an export basis for tobacco, with the export demand for Canadian tobacco being determined by the supply-demand conditions in the world market. As Canada supplies only 5-7 percent of world imports, Canadian export prices are relatively unaffected by variations in the level of its own exports. In fact, world price levels have explained almost all of the variation in Canadian export prices.

There is no price discrimination between the Canadian export and domestic market buyers, and consequently Ontario tobacco prices are determined in the export market. This conclusion has extremely important implications for tobacco producers as it indicates that the Ontario supply control program has had virtually no effect on tobacco prices, since the increased prices observed would have occurred without the Tobacco Board's program. As a result, producers have suffered very substantial losses in earnings through foregone tobacco sales, and Canada may have jeopardized its ability to fulfill its competitive potential in world markets.

It is strongly recommended that the Tobacco Board shed its conservative production policy. It is important for the general welfare of the Ontario industry that the Board adopt a more aggressive marketing strategy, relax acreage controls and gradually permit an increase in flue-cured tobacco production.

1. INTRODUCTION

1.1 The Canadian Tobacco Industry

Flue-cured tobacco is one of the most valuable commodities produced in Ontario. In 1970, farm value of tobacco production was $129.7 million, more than 9 percent of Ontario's gross farm income [10]. Most of the Canadian flue-cured tobacco production is concentrated in a few South-Western Ontario counties, with the province accounting for 87 percent of total Canadian acreage in 1970 [5, p. 70]. Tobacco ranks second only to wheat in value of agricultural exports from Canada.[1] Exports in 1969 amounted to $58.9 million and were almost exclusively flue-cured [3, p. 37]. The United Kingdom (UK) is the major recipient of our exports accounting for as much as 90 percent of total Canadian tobacco annual exports (Table 1). Canada's share of the world tobacco market is less than 4 percent and approximately 7 percent of the world flue-cured market.

Marketing institutions have played a key role in the development of the Ontario tobacco industry and its marketing practices.[2] Supply control has been used extensively to facilitate the orderly marketing objectives of producers. Voluntary supply control existed as early as 1936, with the introduction of the Ontario Flue-Cured Tobacco Marketing Association, representing both growers and buyers. Supply controls became compulsory

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[1] Prior to 1970. It has been surpassed by rapeseed, subsequently.

[2] This history has been well documented by Campbell [2], Elz [11], MacGregor and Klosler [16], Trant [28] and Walker [31].

in 1957 with the formation of the Ontario Flue-Cured Tobacco Growers' Marketing Board, representing only producers.

TABLE 1. Total Canadian Flue-Cured Tobacco Exports, and Exports to the U.K. and the EEC, 1958 to 1971

Year	Total Exports	To The U.K.		To The EEC	
	Thousand Pounds, Dry Weight				
			%		%
1958	27,734	20,870	75	2,802	10
1959	37,853	29,039	77	3,012	8
1960	34,473	28,569	83	1,568	5
1961	37,384	33,632	90	993	3
1962	46,804	34,467	74	7,074	15
1963	35,592	27,814	78	4,016	11
1964	48,671	33,756	69	4,906	10
1965	38,854	32,536	84	1,279	3
1966	35,631	30,475	86	1,398	4
1967	41,261	34,971	85	1,438	4
1968	46,423	40,262	87	946	2
1969	51,090	44,628	87	1,162	2
1970	47,370	40,101	85	641	1
1971	48,535	41,487	85	1,916	4

Source: Tobacco Intelligence, 1960 to 1972, inclusive.

Production control is exercised through acreage allotment rights. All tobacco producers have been assigned or have purchased a basic acreage allotment. Each year, prior to planting, the Board announces the marketable acreage which is a percentage of each producer's basic acreage allotment. The marketable acreage

is established after the coming year's sales (in pounds) have been estimated through consultation with domestic and foreign buyers. The Board then employs a standard formula to convert poundage of sales to marketable acreage.[1]

The existence of a sophisticated supply management mechanism and marketing-distribution organization has not eliminated all of the marketing or production problems of the industry. Consequently, after 15 years of being cited as the model of successful supply management, the Ontario tobacco industry is confronted with several policy alternatives which could dramatically shape the structure and performance of the industry over the next decade.

A prime dilemma of the industry is Canada's almost complete reliance on the U.K. market for export sales. The dilemma is magnified by the uncertainty of the U.K.'s future demand for tobacco, the increasing extent of competition from other suppliers, and most of all, anticipation of new adverse "rules of the game" resulting from U.K. entry into the Common Market Community of Ten. Another area of consternation arises from the growing proportion of the world's flue-cured tobacco exports coming from low-cost producers (e.g. India and some African and Far East countries) which suggests potential erosion of Canada's relative and, possible, absolute share of the world market. Undoubtedly, the most decisive threat to Canada from low-cost producers is the expectation of Rhodesia's complete re-entry into the world tobacco market.

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[1] This procedure is complicated as a result of exempting three acres per farm before setting the percentage of marketable acreage for the remainder of the basic acreage.

On the production side, the variability and expected decline in Ontario tobacco producers' marketable acreage prevents effective long-run planning, adds to the instability of producers' incomes and creates inefficiencies with respect to land use relative to other nonrestricted inputs. Moreover, while increased supply restrictions in Ontario caused a 33 percent decline in acreage (41,000 acres) in the past three years (1967-70), acreage in the Maritimes expanded 210 percent (3,300 acres). The very high values associated with the rights to produce tobacco illustrate the magnitude of potential resistance by present producers to any substantial changes in policy for the tobacco industry.

1.2 Objectives and Procedures

The primary goals of this study were to provide participants in the Ontario tobacco industry with a comprehensive analysis of present and future market conditions and to use this analysis to evaluate alternative approaches which policy-makers in the industry might conceivable adopt.

In order to achieve these above goals, the specific objectives of this study were to:

(1) evaluate the prospective demand for Ontario tobacco in both domestic and world markets;

(2) assess the impact of changes in production levels or other production policies on the Ontario tobacco industry; and

(3) identify alternative policy strategies for the Ontario industry and some of the implications for each of these alternatives.

These objectives were carried out in the next two chapters. Assessment of export demand required detailed information on the emerging supply, demand situation and institutional and policy characteristics in the major importing and exporting countries. Canada's economic relationships within the world tobacco market and between its domestic and export market were formulated in a total demand model for the industry, a procedure necessary to establish the impact of external conditions and to evaluate alternative policies which could be implemented by Canada.

The impact of supply control in the Canadian tobacco industry was first evaluated through identification of its effects on two main participating groups -- tobacco producers, and domestic or foreign consumers. To explicitly quantify the relative importance of these effects, a social cost analysis was undertaken. Finally, the implications of relaxing the level of supply control in Ontario were outlined and evaluated.

2. DEMAND FOR ONTARIO TOBACCO

2.1 Introduction

The market for Ontario tobacco is composed of two distinct segments -- the domestic and foreign markets. The domestic market has traditionally accounted for 70 - 80 percent of total production (Table 2). Major concentration in this Chapter is on the export market, for two reasons. First, foreign demand is less stable and more difficult to predict, since it depends on the supply-demand balances not only of the importing countries, but also of other exporting countries. Second, this is the market that is likely to absorb the brunt of any large change in Canada's tobacco production policy. Consequently, more analysis is required for the export market to identify probable impacts of domestic or foreign policy change.

TABLE 2. Total Canadian Flue-Cured Tobacco Production and Percentage Exported 1961-70

Year	Total Production (mil. lbs. green wt.)	Domestic Consumption (percent)	Exports (percent)
1961	195	78.5	21.5
1962	188	71.8	28.2
1963	187	77.0	23.0
1964	143	58.0	42.0
1965	159	68.5	31.5
1966	224	77.2	22.8
1967	204	71.1	28.9
1968	211	68.2	31.8
1969	240	69.2	30.8
1970	214	66.4	33.6
10 yr. ave.		70.6	29.4

Source: Statistics Canada 65:004, using conversion factor that 89 lbs. redried weight is equivalent to 100 lbs. green weight.

This Chapter identifies and evaluates the current and anticipated production, consumption and trade patterns and government policies of Canada's major export competitors (Rhodesia, the United States and India), and the two major importing regions (the United Kingdom and the European Common Market). The nature of Canada's domestic market for tobacco is also briefly discussed. Finally, a model of the demand for Ontario tobacco is formulated and its important idiosyncrasies are evaluated.

2.2 Major Exporters of Tobacco

A. Rhodesia

Until recently, it appeared that Rhodesia had ceased to be an important influence in the world tobacco market. A dramatic "about face" in the political relationships between Rhodesia and the U.K. is being negotiated with the expectations that there will be restoration of trade between them and probably, most other countries.

Prior to its 1966 unilateral declaration of independence, Rhodesia was the world's second largest exporter of tobacco. Ninety-five percent of its tobacco was exported, almost one-half of it to the U.K. and one-quarter to the EEC (Table 3). Speculation as what percent of pre-sanction trade Rhodesia can now regain hinges upon such factors as the reluctance of manufacturers to switch supply sources, the competitiveness of the other small tobacco producers which partially filled the vacuum left by the Rhodesian embargo (especially in the U.K. market), and, indeed, the permanent impact of Rhodesia's curtailment of domestic production over the past six years. Rhodesia has stocks, estimated at 300 million pounds,[1] approximately

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[1] USDA. Foreign Agriculture. (Dec. 13, 1971), p. 8.

2.5 times current production levels and 3 years supply at its recent export levels.[1] Production is expected to increase to 150 million pounds in 1972.

TABLE 3. Rhodesia: Total Exports of Flue-Cured Tobacco and Exports to the U.K. and the EEC, 1959 to 1965.

Year	Total Exports	To U.K.		To E.E.C.	
	Thousand Pounds	Thousand Pounds	Per-Cent	Thousand Pounds	Per-Cent
1959	147,250	80,667	55	32,382	22
1960	162,058	88,616	55	37,956	23
1961	180,384	93,846	52	41,729	23
1962	187,962	79,183	42	57,481	31
1963	179,764	91,198	51	42,917	24
1964	223,668	99,884	45	59,133	26
1965	261,398	101,923	39	76,121	29

Source: C.E.C., Tobacco Intelligence, 1960 to 1966 inclusive.

B. The United States

The U.S. is the dominant world producer and exporter of flue-cured tobacco (Table 4). Its domestic prices are supported through Commodity Credit Corporation (CCC) purchases. During 1960-71, carryover stocks of flue-cured tobacco ranged from 2.0 to 2.5 billion pounds, equivalent to almost two years of U.S. production or

[1] Financial Post. (Dec. 17, 1971).

TABLE 4. Estimated Exports of Unmanufactured Tobacco by Main Types of Cigarette Leaf, Main Exporting Countries

	1955-57 average	1959-61 average	1964-66 average	1967	1968	1969
	(. . . . . Thousand tons dry weight . . . . .)					
FLUE-CURED						
Canada	16.6	16.6	18.6	18.7	21.1	23.2
United States	195.7	179.1	176.5 [2]	193.8	201.2	194.6
Japan [1]	1.2	2.6	3.4 [2]	3.5	3.3	2.8
South Africa, Republic of	0.4	2.9	5.9 [2]	7.2	8.0	11.0
Malawi			1.2 [3]	1.5	1.8	2.3
Rhodesia	54.4	75.1	109.5 [2]	-	-	-
Zambia			6.8	4.3	3.4	3.4
India	34.7	30.1	47.3	46.1	40.8	42.4
China (Taiwan)	-	1.1	3.2	2.9	3.1	2.7
Korea, Rep. of	-	0.2	3.4	9.7	8.8	16.7
Thailand [1]	3.9	1.4	6.2	8.2	9.9	8.2 [4]
Total	306.9	309.1	382.0	295.9	301.4	307.3
BURLEY						
Canada	0.5	0.8	1.1	0.3	0.3	0.2
United States	12.2	15.4	21.8	20.5	19.4	23.6
Greece	-	-	2.8	4.5	7.9	8.7
Italy	...	...	2.6 [2]	5.0	5.3	5.0
Japan	1.4	3.2	4.7 [2]	2.4	3.5	3.6
Malawi			2.3 [3]	2.0	2.8	2.8
Rhodesia		0.8	1.2 [3]	-	-	-
Zambia			1.5	0.2	0.1	0.3
Mexico [1]	0.3	0.8	6.1	4.0	4.1	5.9
Korea, Rep. of	-	-	0.5	1.1	2.1	3.4
Total	14.4	21.0	44.6	40.0	45.5	53.5
ORIENTAL						
Greece	57.5	60.6	69.3	83.2	62.3	62.3
Yugoslavia [1]	16.9	16.8	22.3	19.2	15.9	13.6
Malawi			-	-	-	-
Rhodesia	-	0.4	0.4 [3]	-	-	-
Zambia			-	-	-	-
Cyprus	0.7	0.7	0.5	0.6	0.7	1.6
Lebanon [1]	0.6	1.2	1.7	4.2	2.4	4.5
Syria	0.6	0.7	0.2	1.3	1.9	2.0
Turkey	69.7	71.1	70.4	91.8	81.3	69.7
Bulgaria	42.1	63.9	77.1	75.5	67.6	59.0
Total	188.1	215.4	241.9	275.8	232.1	212.7

[1] May include some minor quantities of other tobacco

[2] 1965-1966 average

[3] 1964-1965 average

[4] An additional quantity of some 20,000 tons is estimated to have been exported by China (Mainland).

Source: FAO Outlook for Production, Consumption and Trade of Tobacco, Committee on Commodity problems 46 session, July 1971, Rome.

annual world production.[1] The CCC inventory, however, averaged 0.8 million pounds.[2] While part of this inventory may be a shift from private (manufacturers) to public (CCC) stocks, they do pose a threat to any exporting country attempting to expand its market share. Since June 1966, tobacco receiving price supports has been eligible for a 5 cents per pound export subsidy.[3] In addition to acreage controls, a poundage per acre or marketing limitation was imposed in 1965 to more effectively control production. This legislation brought about marked improvement in quality.[4] The U.S. appears to provide a price umbrella for other exporters. While its export prices are usually the highest of any country, as shown by U.K. import prices (Table 5), this probably reflects in part

TABLE 5. United Kingdom: Average Value of Imports of Stripped Flue-Cured Tobacco, in Pence Per Pound, Exclusive of Duty, 1964 to 1971

Country	1964	1965	1966	1967	1968	1969	1970[a]	1971[a]
Canada	63.1	67.8	69.1	80.7	95.9	89.6	91.3	100.8
India	54.7	58.5	61.7	53.2	61.0	58.9	66.6	69.6
Rhodesia -	55.4	-	-	-	-	-	-	-
Zambia	-	60.9	54.4	77.8	78.6	73.6	102.4	88.8
Malawai -	-	73.9	63.5	77.3	74.5	78.4	84.0	93.6
Tanzania	-	-	47.5	50.9	38.8	57.7	54.3	64.8
U.S.	81.5	87.0	84.8	85.5	91.3	106.8	121.1	120.0
South Africa	38.8	32.1	37.3	25.1	47.0	47.3	85.4	64.8

[a] Figures for 1970 and 1971 not comparable to other years, as these data relate only to tobacco above 10 percent moisture, and consequently exceed previous average values. New pence data for 1971 converted to old pence using factor of 2.4.

Source: Tobacco Intelligence

[1] USDA. Foreign Agriculture. (Dec. 13, 1971) p. 8.

[2] Commonwealth Secretariat. Tobacco Intelligence. (Feb. 1971), p. 39.

[3] USDA. Tobacco Situation (June 1966), p. 12.

[4] Commonwealth Secretariat. Plantation Crops (1970) p. 170.

the quality premium of U.S. tobaccos.[1]

C. India

Indian tobacco exports, especially to Eastern European Countries have fluctuated widely (Table 6). The U.K. is the largest recipient of Indian tobacco, partly accounted for by the Commonwealth tariff preference. Current measures to decrease variability of supply and quality and to increase output marked India as the potential replacement for Rhodesia in the world tobacco market [30, p. 280]. Government production subsidies should increase tobacco production while capital supplied by international tobacco companies (such as Imperial Tobacco Company of India) may induce more rigidity in international trade patterns.

In summary, the major change in the world flue-cured tobacco export market during the past decade has been the disappearance and apparent re-emergence of Rhodesian tobacco. The impact of the latter will have the greatest impact on countries producing low-priced tobacco such as India, South Africa, Malawi, Tanzania, and South Korea. Undoubtedly, it will depress world flue-cured tobacco prices, reversing the trend of the late 1960's when Rhodesia's presence in the world market was considerably diminished. The U.S. poses a distinct threat from its sizeable tobacco stocks and recent tendency toward policies of aggressive salesmanship and government export assistance.

2.3 Major World Importers

Over one-half of the free world tobacco imports are accounted for by the European Economic Community (EEC) and the United Kingdom (U.K.). Considerably more attention is given to the U.K. in this study because of

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[1] Data on export prices by grade were not available to confirm this hypothesis.

TABLE 6. Indian Flue-Cured Tobacco Exports, and Exports to the U.K., the EEC, and Eastern Europe, 1959 to 1970

Year	Total Exports	To the U.K.		To the EEC		To E. Europe[1]	
	'000 lbs. dry weight	'000 lbs. dry weight	%	'000 lbs. dry weight	%	'000 lbs. dry weight	%
1959	66,646	33,879	51	8,043	12	9,795	15
1960	62,479	30,229	48	6,949	11	9,096	15
1961	70,343	44,397	63	8,423	12	7,590	11
1962	118,629	37,538	32	8,078	7	63,851	54
1963	114,534	37,391	33	8,224	7	56,158	49
1964	135,933	33,376	25	5,349	4	82,692	61
1965	114,562	33,204	29	4,513	4	63,266	55
1966	62,174	30,447	49	4,129	7	16,208	26
1967	99,502	46,361	47	4,404	4	21,369	22
1968	92,055	47,977	52	3,132	3	19,826	22
1969	93,380	40,519	43	3,049	3	26,248	28
1970	86,388	38,590	45	7,992	9	19,071	22

[1] Includes U.S.S.R., Hungary, Poland, Yugoslavia, Eastern Germany and Czechoslovakia.

Source: Tobacco Intelligence, 1960 to 1972 inclusive.

its dominant role for Canadian tobacco exports.

A. The European Economic Community

The EEC is the world's largest import market for unmanufactured tobacco, importing two-thirds of its

total consumption.[1] Imports have been rising over the past decade, particularly from the U.S. (Table 7). There exists a high degree of variation among the EEC countries in types of tobacco consumed and in the methods of taxation [30, p. 212]. The adoption of the common agricultural policy (CAP) for tobacco is likely to reduce this variation and also have a considerable impact on the type and quantity of imports.

There are three aspects of the CAP that are likely to affect tobacco exporters: the common external tariff, the preferential trade status accorded the associate EEC members, and most important, the internal price and production policies.

The level of the common external tariff was reduced in the Kennedy Round negotiations in the General Agreement on Tariffs and Trade from 28 to 23 percent, ad valorem, with minimum duties at 12.7 and 15 cents per pound.[2] The final stage of this reduction occurred July 1, 1971. Previously, duties in Benelux and West Germany were 3.7 and 19.4 cents per pound, respectively, while imports into France and Italy were duty-free, although quantitatively controlled by state monopolies.

Greece and Turkey associate member countries of the EEC are allowed to export tobacco to the EEC duty-free. The tobacco from these two countries is the oriental type, not flue-cured. However, the EEC manufacturers have an incentive to adjust their blends to include more Greek and Turkish tobacco to the extent such adjustments are feasible. Little increase has occurred in their exports to the EEC by 1970.

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[1] Only Italy, which is almost self-sufficient, and France produce significant quantities of tobacco.

[2] USDA. Tobacco Situation (September 1967) p. 29.

TABLE 7. EEC Imports of Unmanufactured Tobacco, and Imports From Greece, Turkey, and the U.S., 1958 to 1970

Year	Total Imports	From U.S.		From Greece		From Turkey	
	'000 lbs. dry weight	'000 lbs. dry weight	%	'000 lbs. dry weight	%	'000 lbs. dry weight	%
1958	390,313	112,997	29	61,213	16	29,432	8
1959	395,787	103,501	26	61,497	16	25,287	6
1960	439,164	126,180	29	55,386	13	21,898	5
1961	473,633	124,958	26	50,877	11	30,009	6
1962	602,564	147,517	25	67,998	11	53,289	9
1963	578,801	152,832	26	47,244	8	22,309	4
1964	596,186	146,681	25	58,499	10	19,408	3
1965	609,176	158,875	26	65,873	11	18,487	3
1966	631,064	171,574	27	70,946	11	30,304	5
1967	663,617	189,755	29	69,203	10	30,221	5
1968	538,087	144,756	27	67,531	13	27,736	5
1969	665,035	178,289	27	75,437	11	28,055	4
1970	640,502	142,413	22	69,204	11	34,494	5

Source: Tobacco Intelligence, 1960 to 1971, inclusive.

Free movement of tobacco throughout the community is essential for the operation of the CAP, which requires uniform internal policies in all member countries. Important changes in internal policies were the disbanding of tobacco monopolies in Italy and France,[1]

[1] These exclusive rights for importation and wholesale are to be abolished by January 1976 (Tobacco Intelligence, May 1971, p. 108).

uniformity in excise taxes,[1] and consistent price and production guarantees at the farm level.

The agreement regarding harmonization of excise taxes should standardize EEC consumption patterns. At present, the fiscal policies pursued have distorting effects upon purchases of raw tobacco. For example, in Belgium, taxation is based upon the value of the leaf, thus encouraging the use of cheaper leaf, whereas in Germany taxation is based upon the unit price of cigarettes, thus giving manufacturers no flexibility to reduce the amount of tax per cigarette [30, p. 118].

The CAP for domestic prices is undoubtedly of most concern to third country exporters. Producer prices are supported by a deficiency payment so that internal market prices are determined by the level of import prices plus the tariff. Guaranteed (target) prices are set annually with purchases occurring when prices decline to 90 percent of these target levels. For 1970 and 1971, target prices were set 11 to 24 percent above 1967-69 levels.[2] The deficiency payment is paid to buyers which is to be passed back to growers. It is intended to cover the difference between target and market prices. To illustrate its impact, Italian burley tobacco receives a deficiency payment of about 30 cents per pound. This is equivalent to the previous price of Grade C burley thereby making buyers net cost effectively zero and hence, eliminating all low grade burley tobacco imports.[3]

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[1] Agreement has been reached with harmonization occurring in stages between July 1971 and January 1980 (Tobacco Intelligence, May 1971, p. 109).

[2] USDA. Tobacco Situation (December 1970) p. 29.

[3] USDA. Foreign Agriculture (December 6, 1971) p. 12.

Tables 8 and 9 show historical supply-demand balances in EEC countries and projections for 1975. Both of these projections indicate rising net imports (e.g. FAO indicates an increase of 7 percent above 1970 levels). However, both of these projections were constructed without knowing the impact of CAP tobacco policies, and consequently, production projections for 1975 may be conservative.

In summary, EEC tobacco production is expected to expand, particularly in Italy but also in France. This expectation is based on substantially higher and more stable producer prices. Intra-EEC trade, now about five percent of consumption, should increase. Most significant increases will probably be in Italian exports to West Germany and Benelux countries. Very little of this trade creation, however, will be flue-cured tobacco and consequently, exporters of tobacco other than flue-cured will be most affected in the short-run. Flue-cured exporters are likely to see their market share diminish more gradually. Greek and Turkish tobacco are likely to displace other exporters of these types of tobacco because of their duty-free access. The magnitude of the impact to flue-cured exporters will depend on the ability of EEC tobacco manufacturers to adjust their blends.

B. The United Kingdom

There are four important aspects of the U.K. tobacco market about which Canada should be concerned. These are the trends in the share of the market supplied by competing exporters, restrictions on tobacco imports and consumption, anticipated future levels of cigarette and tobacco consumption and the impact of EEC enlargement. Each of these dimensions will be outlined in this section.

The U.K. does not produce any tobacco, hence all consumption comes from imports. Its major sources

TABLE 8. The EEC: Raw Tobacco Supply-Demand Balance, 1960 and 1965, and Projections for 1970 and 1975, in Thousand Tons

Country	1960			1965			1970			1975		
	Demand	Production	Net Imports	Demand	Production	Net Imports	Demand	Production	Net Imports	Demand	Production	Net Imports
West Germany	98	11	87	143	9	134	166	13	153	184	13	171
France	72	49	23	97	49	48	97	50	47	111	50	61
Italy	75	80	-5	80	74	6	NA	NA	NA	NA	NA	NA
Netherlands	46	-	46	43	-	43	49	-	49	55	-	55
Belgium and Luxembourg	30	2	28	33	2	31	NA	NA	NA	NA	NA	NA
EEC	321	142	179	396	134	262	NA	NA	NA	NA	NA	NA

Source: Aggregation of Future Demand and Supply for Agricultural Products in the European Economic Community 1970 - 1975, Institut Fur Wirtschaftsforschung, Munich, 1969.

TABLE 9. EEC: Actual and Projected Supply and Demand for Unmanufactured Tobacco

Country	Demand				Supply				
	1964-66 Base Period	1970 (Adjusted)[1]	1975 Projected	1980 Projected	1968	1969	1970 (Adjusted)[1]	1975 (Projected)	1980 (Projected)
	(thousand tons, farm sales weight)								
Benelux	33	35	37	39	NA	NA	NA	NA	NA
France	102	109	117	126	52	48	47	50	52
West Germany	152	158	165	172	NA	NA	NA	NA	NA
Italy	86	95	105	116	74	79	78	84	95
EEC	413	441	472	505	135	137	135	144	157

[1] Random fluctuations are eliminated.

Source: FAO Outlook for Production, Consumption and Trade of Tobacco, Committee on Commodity Problems, 46 session, July 1971, Rome.

of imports before the Rhodesian embargo were the four largest suppliers -- the U.S., Rhodesia, Canada and India. Subsequently, there has been gradual diversification of supply sources with an increasing volume coming from smaller producers (Tables 10 and 11). Nevertheless, after 1965 the U.S., Canada and India all tended to increase their export share. Time series regression for 1958-70 were constructed to estimate annual average changes in total U.K. imports and imports from individual countries of flue-cured tobacco.[1] The results of these regressions and analysis of market shares illustrate some very significant changes in the character of the U.K. import market. No significant trends for total imports or imports from any major importer, except Canada were found. Imports from Canada increased at the annual rate of six percent. For the 5 smaller importers, there were some very substantial annual growth rates ranging from a low of 22.1 percent for South Africa (1960-70) to 911.6 percent for South Korea (1967-70). In 1963-65 the 4 largest suppliers (Table 10) dominated the U.K. market accounting for 98 percent of imports while the 5 smaller suppliers (Table 11) accounted for most of the remaining 2 percent. The distribution of market shares changed substantially by 1970 with the big 3 supplying only 75 percent and the smaller 5 accounting for 17 percent of the U.K. market. The former Rhodesian share had been redistributed approximately one-quarter to the big three, one-half to the small five and one-quarter to other suppliers. There appears to be two important reasons for non-traditional sources to provide a larger percentage of Rhodesia's previous market share: lower prices and reluctance of U.K. manufacturers to concentrate to the same extent as hitherto upon a few supply sources.

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[1] The estimated regression equations are found in Appendix 3.

TABLE 10. The United Kingdom, Total Imports of Flue-Cured Tobacco, and Imports From Major Suppliers: The U.S., Rhodesia, India and Canada, 1958 to 1971

Year	Total Imports	From the U.S.		From Rhodesia		From India		From Canada	
	Thousand Pounds Dry Weight								
			%		%		%		%
1958	293,360	161,414	55	65,402	22	41,787	14	22,256	8
1959	281,544	137,854	49	77,894	28	34,888	12	28,487	10
1960	340,614	174,735	51	93,356	27	39,445	12	28,639	8
1961	329,497	155,377	47	94,886	29	40,506	12	34,736	11
1962	263,940	103,503	39	84,577	32	37,227	14	34,596	13
1963	304,810	142,020	47	92,432	30	35,725	12	31,430	10
1964	292,539	121,186	41	97,300	33	31,582	11	38,753	13
1965	263,261	87,877	33	83,425	32	32,710	12	35,955	14
1966	239,528	129,008	54	15,206	6	29,058	12	39,396	16
1967	263,589	130,871	50	-	-	51,619	20	45,280	17
1968	310,831	162,562	52	-	-	49,958	16	44,030	14
1969	291,710	133,168	46	-	-	46,007	16	55,532	19
1970	269,844	115,749	43	-	-	39,669	15	46,886	17
1971	226,448	83,557	36	-	-	32,559	14	46,757	21

Source: Tobacco Intelligence, 1960 to 1972, inclusive.

TABLE 11. The United Kingdom: Imports of Flue-Cured Tobacco From Minor Suppliers: South Africa, Pakistan, Malawi, Tanzania, and South Korea, 1960 to 1971

Year	South Africa		Pakistan		Malawi		Tanzania		South Korea	
	Thousand Pounds				Dry Weight					
		%		%		%		%		%
1960	2,440	0.7	-	-	-	-	-	-	-	-
1961	3,301	1.0	-	-	-	-	-	-	-	-
1962	3,838	2	-	-	-	-	-	-	-	-
1963	2,481	1	-	-	-	-	-	-	-	-
1964	3,525	1	-	-	-	-	-	-	-	-
1965	7,537	3	-	-	1,435	0.5	-	-	-	-
1966	8,485	4	640	0.3	5,728	2.0	2,652	1	-	-
1967	9,898	4	2,195	0.8	6,689	3	4,614	2	2,483	0.9
1968	12,753	4	9,978	3.0	9,283	3	8,034	3	884	0.3
1969	16,417	6	6,550	2.0	8,079	3	6,666	2	6,365	2.0
1970	12,921	5	3,634	1.3	8,869	3	8,090	3	13,129	4.9
1971	10,317	5	2,791	1.2	11,174	5	6,939	3	6,972	3.1

Source: Tobacco Intelligence, 1962 to 1972, inclusive.

The distribution of market shares for tobacco exports generally changes very slowly since manufacturers in the importing countries strive to maintain continuity in cigarette taste. Tobaccos, even of the same type and quality but from different geographical areas have distinctively different flavours. Filter-tip cigarettes, however, allow manufacturers much more flexibility to change tobacco blends and to use lower quality tobaccos. Over 90 percent of U.K. tobacco imports are of the flue-cured type and are largely consumed as manufactured cigarettes (Appendix Table A.1). Filter-tip cigarettes now account for nearly 80 percent of the U.K. cigarette market (Appendix Table A.2).

The U.K. tariff on unmanufactured tobacco imports is over 10 times the value of imported tobacco and is a specific tariff, a fixed amount per pound (Table 12). Manufacturers are thereby encouraged to buy high quality tobaccos. A Commonwealth preference of 18 to 20 cents per pound, is enjoyed by Canada, India, Malawi and Zambia.

TABLE 12. The U.K.: Level of Import Duties on Raw Tobacco Prevailing After the 1968-69 Budget

Type of Tobacco	FULL RATE		COMMONWEALTH PREFERENCE RATE	
	per pound			
	Shillings	$ U.S.	Shillings	$ U.S.
With more than 10% moisture	91/8½^{d}	11.00	90/2^{d}	10.82
With less than 10% moisture	92/8½^{d}	11.12	91/0^{d}	10.92

Source: Tobacco Intelligence, 20, No. 5, (1968).

Estimates of the recent rate of growth in U.K. tobacco consumption vary substantially depending on the choice of indicators. For example, the annual rate during 1957-70 of growth for consumer expenditures was 4.6 percent, for cigarette consumption it was 1.5 percent, while for cigarettes consumption per adult it was 0.9 percent. Conversely, the total consumption of unmanufactured tobacco actually declined by 0.5 percent.[1]

One important reason for the relatively larger increase in consumer expenditures was the sharp boost in excise tax which occurred during this period. Taxes now account for approximately 70 percent of retail price. To offset this tax increase, manufacturers have lowered the tobacco content of cigarettes, partially explaining the observed difference in the rate of growth in cigarette and unmanufactured tobacco consumption. Several other factors in recent years also have increased the cost of tobacco and tobacco manufacturing, notably the deevaluation of the sterling in November 1967, the application of the selective employment tax in 1967, the large tax increase in 1968, and the exhaustion of Rhodesian tobacco inventories.

Consumer demand for cigarettes in the U.K. is related to a large number of variables, the most significant of which are: size of the adult population, per capita disposable income, retail price and consumer tastes and preferences (including its perceived effect on health).

Growth in adult population in the U.K. is unlikely to be a significant source of increased cigarette consumption. Estimates of the rate of increase during 1970-80 in the size of the 15-64 year old group in the

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[1] The empirical results of these estimated regressions are found in Appendix 3.

U.K. was only 0.6 percent [22, p. 101]. Population growth will be an even less important factor if the proportion of smokers declines, as is occurring in the U.S., especially among the male, 17 to 24 year old age group [18, p. 12].

The effect of changes in disposable income and retail price are shown by income and price elasticities of demand. A recent U.S. study estimated a retail income elasticity of 0.15 and price elasticity of -0.89 [18, p. 5]. Several other U.S. studies yielded higher income but lower price elasticities. Miller's price elasticity is considered to be an over-estimate since consumption was expressed in number of cigarettes during a period when the size of cigarettes were declining and hence the price increase is underestimated. If the effects of income and price are similar in the U.K., increases in prices or income will not have much effect on the quantity of tobacco consumed in the U.K.

Undoubtedly, the most important single factor affecting tobacco consumption is its possible detrimental effects on health, particularly on the incidence of lung cancer. There is a mounting anti-smoking campaign in the U.K. to create public awareness of these health effects. In 1962 when the Royal College of Physicians published "Smoking and Health", there was a distinct decline in cigarette consumption.[1] A similar reaction occurred in 1965 when television advertising was banned. For existing smokers, these reactions appeared to be only temporary. The significant long-run impact, however, is on the number of people who will start smoking; there may be a reduction in the smoking population in the future.

An important trend, reducing the rate of consumption of unmanufactured tobacco is the declining amount of tobacco used per cigarette. These are two

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[1] C.E.C. Plantation Crops, Vol. 10 (1964) p. 169.

main reasons for this reduction. Filter-tip cigarettes enable manufacturers to decrease the tobacco content of a cigarette by as much as 20 percent. In addition, changes in manufacturing technology have enabled greater efficiency in utilization. Use of processed stems and reconstituted tobacco sheet made from stems and small fragments of leaf have greatly increased filling capacity. In the U.S. from 1950-64 to 1968 the amount of flue-cured tobacco used per thousand cigarettes declined from 1.68 to 1.0 pounds [1, p. 154-5].

Since the U.K. is their largest export market, Canadian tobacco producers are justifiably concerned about the rate of growth of the U.K. market for unmanufactured tobacco. The magnitude of its growth rate is derived from the demand for cigarettes in the U.K. However, rate of growth in cigarette demand overstates the demand for unmanufactured tobacco because of the two reasons cited above -- decreasing tobacco per cigarette and improved utilization in manufacturing.

The effect on cigarette consumption of the previously identified demand variables was measured by means of a multiple regression equation. From this equation, future cigarette consumption in the U.K. is predicted for 1971-80. Since tobacco lacks close substitutes and consumption patterns change very slowly, it was assumed that the economic relationships in the observed period would remain stable in the projected period. A logarithmic functional form was used in order to obtain direct estimates of price and income elasticities. The following equation was obtained by ordinary least squares from 1949-70 data:[1]

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[1] The usual assumptions for statistical estimation were made: the exogenous variables were assumed to be uncorrelated with each other and with the disturbance terms and that the disturbance terms were normally distributed with zero means, constant variance and independent over time.

$$y_t = 3.01 + 0.54y_{t-1} - 0.02x_{1t} - 0.08x_{2t} + 0.15x_{3t}$$
$$\qquad\quad (0.18)^{**} \quad (0.01)^{**} \quad (0.09) \quad (0.09)^{*}$$

$$R^2 = 0.99$$

where: y is the (ln) annual number of cigarettes consumed per adult 15 years and over in the U.K.

x_1 represents short-run effects of health scares, it has a value of (ln) 2.718 for 1962 and 1965 and one for all other years.

x_2 is the (ln) average retail price per package of 20 regular cigarettes, in pence.

x_3 is the (ln) per capita income in the U.K., in pounds sterling.

t is time in years, 1950-70.[1]

The explanatory variables accounted for 99 percent of the variation in cigarette consumption. All of the estimated coefficients had signs consistent with economic logic. The price variable was not significantly different from zero at the five percent level. One explanation for this is an inflated standard deviation resulting from multicollinearity. A high simple correlation exists between lagged consumption, prices and income.

The results of the equation gave a price elasticity of demand of -0.08 and an income elasticity of demand of 0.15. A major health scare would reduce cigarette consumption by approximately five percent, during one year.

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[1] Data used in this calculation is found in Table A.5.

The structure of the equation allowed an estimation of a long-run demand function incorporating the lagged effects of habit, and expectations, not observed in the short-run results presented above.[1] The long-run price and income elasticities of demand were estimated to be -0.17 and 0.33, respectively. A health scare, if continued over time would reduce consumption by approximately 10 percent.

The estimated elasticities, while consistent with several U.S. studies,[2] may be biased. As identified earlier, the use of cigarettes as an indicator of tobacco consumption creates an upward bias since it ignores the decreasing size of cigarettes. This is particularly important in the U.K. where "mini-cigarettes" now predominate. Conversely, the use of undeflated data for prices and income cause a downward bias in the estimated coefficients of these variables. These shortcomings do not affect projections as long as the economic relationships remain i.e. if the rate of reduction in tobacco content per cigarette and inflation remains the same in the projected period. It is unlikely that this former rate can be maintained.

To obtain projections of cigarette consumption for 1971 to 1980, future price and income values for this period were required. During 1949-68, the increase in the value of these variables closely followed a linear time trend.[3] By extrapolating these trends from 1969 to 1980 and inserting these values in the estimated demand

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[1] M. Nerlove. The Dynamics of Supply: Estimation of Farmers Response to Price (Baltimore: John Hopkins Press, 1958). The coefficient of expectation was found to be 0.46.

[2] Ibid., Miller [18, p. 5].

[3] For estimated functions, see Appendix 3.

equation, projected values of cigarette consumption to 1980 were obtained (Table 13). These values are undoubtedly high since they assume no further health scares.

TABLE 13. Projections of Per Capita Cigarette Consumption in the U.K. 1971 to 1980, and Values of the Independent Variables Used to Project Consumption

Year	Per Capita Cigarette Consumption	Price Pence Per Pack	Income per Capita Pounds Sterling
1970	2880	58.3	620.4
1971	2835	59.6	641.2
1972	2840	60.9	662.0
1973	2851	62.2	682.8
1974	2865	63.5	703.6
1975	2880	64.8	724.4
1976	2896	66.1	745.2
1977	2912	67.4	766.0
1978	2929	68.7	786.8
1979	2944	70.0	807.6
1980	2960	71.3	828.4

The results indicate that per capita cigarette consumption will likely increase at the rate of 0.5 percent, slightly higher than the rate during 1957-70. From earlier relationships, between rates of growth in cigarette consumption and unmanufactured tobacco utilization, this would imply an annual 0.5 percent decline in the use of manufactured tobacco to 1980. While the reliability of this estimate (0.5 percent) is quite suspect, the fact that it is projected to decline is of substantial significance and contrary to earlier FAO

projections. FAO projected a 6 percent increase from 1961-63 to 1975.[1] Recently, this has been revised to a 3 percent decline by 1975 but increasing to current levels in 1980.[2]

The entry of the U.K. into the EEC is unlikely to have drastic repercussions on its tobacco market before 1980. The main reasons being that the transition period is not likely to be completed until after that date, and also consumers' stable tastes preclude manufacturers from changing sources of supply abruptly. After 1980, however, the U.K. tobacco market could be substantially modified. The exact dimensions, however, will depend on the policies negotiated between the U.K. and the EEC.

The major long-run factor which will adversely affect Canadian exports of tobacco to the U.K. is substitution of demand for flue-cured by other types of tobacco. The U.K. market under the EEC's CAP might eventually take on a composition much like that of West Germany, where flue-cured tobacco accounts for about 35 percent of total consumption. The economic forces causing such a change are the relative prices of the different types of tobacco. Other types of tobacco will become relatively cheaper, the reasons for which were described earlier for the EEC market.

In the short-run, loss of the Commonwealth preference will reduce Canada's competitiveness with the U.S. by 18-20 cents per pound. This will likely either reduce Canada's tobacco prices or volume of exports to the U.K. vis a vis the U.S.

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1 FAO. Agricultural Commodities - Projections for 1975 and 1985, Vol. 1, 1967.

2 FAO. Outlook for Production, Consumption and Trade of Tobacco, July 1971.

In summary, evolving changes in the world tobacco market may have a serious consequence for Canada. It is anticipated that both the EEC and the U.K. will reduce flue-cured tobacco imports from major suppliers. In the EEC, the CAP for tobacco should stimulate internal production (in Italy and France especially) and its discriminatory import policy favours associate members. In the U.K., because of slow growth in the rate of cigarette consumption, smaller cigarettes and "stretching" of tobacco, the use of unmanufactured tobacco is expected to decline to 1980. The EEC has not been a major market for Canada and there appears to be little opportunity for any increased penetration for Canadian tobacco. More important, however, is the impact that U.S. tobacco, normally exported to the EEC, will have on the world market. Its largest export market, the U.K., is also projected to decline in importance. Consequently, if both the U.S. and Canada seek to offset declines in import demand from major markets (U.K. and EEC) by enlarging their share of the U.K. market, each would make it difficult for the other to do so.

2.4 Canadian Demand for Flue-Cured Tobacco

The domestic Canadian market for flue-cured tobacco is considerably larger than the export market (Table 2). It has grown very rapidly with total cigarette consumption now seven times pre-world war two levels [9, p. 188] and over three times 1947 levels (Appendix Table 3). Consumption of all tobacco is approximately 10 pounds per capita, similar to U.S. levels where it is considered near the saturation point with a downward trend anticipated. Canadian per adult capita consumption of cigarettes reached its peak in 1967, although there has been some consumption increases each year, 1969-71. It is a distinct possibility

that cigarette consumption may not grow as quickly as adult population.

The retail domestic demand characteristics for Canadian tobacco were assumed to be similar to those cited for the U.K. The empirical estimation of the Canadian domestic demand function, therefore, expressed per capita adult consumption as a function of retail price, per capita income and lagged consumption to account for the habit effect. The function shown below was estimated by ordinary least squares using time series data for 1958-1970:

$$Y_{1_t} = 1.48 + \underset{(0.13)^{**}}{0.55\ Y_{1_{t-1}}} - \underset{(0.16)^{**}}{0.50\ X_{1_t}} + \underset{(0.10)^{**}}{0.34\ X_{2_t}}$$

$$R^2 = 0.93$$
$$DWS = 1.79$$

**coefficients are significantly different from zero at the one percent level.

where: Y_1 is the (log) number of cigarettes consumed per adult in Canda

X_1 is the (log) retail price index for cigarettes

X_2 is (log) per capita disposable income in dollars

A 1 percent increase in cigarette prices was shown to result in a 0.5 percent reduction in cigarette consumption in that year, and after the lagged affect has been accounted for, there would be a 1.1 percent reduction in cigarette consumption. An increase in personal disposable income of 1 percent results in a rise in cigarette consumption of 0.34 percent in that year and eventually, 0.76 percent. These estimates suffer from similar types of biases as outlined for the U.K. on page 27.

Schweitzer estimated a retail income elasticity for Canada of 0.22, using tobacco expenditures rather than quantities [26, p. 31]. His price elasticity estimate was quite high, -.76 in the short-run and -2.16 in the long-run, indicating considerable consumer sensitivity to tobacco prices. As in the U.K., tastes and preferences including tobacco's perceived effect on health is likely to be the major determinant of cigarette consumption. Television advertising was discontinued in January, 1972, but undoubtedly was replaced by similar expenditures for other media advertising and promotional techniques.

2.5 Total Demand for Ontario Flue-Cured Tobacco

The preceeding sections of this chapter emphasize that the total demand for unmanufactured Ontario tobacco arises from two distinct sources: the domestic and the export markets. The postulated nature of the demand relationships in these markets is illustrated

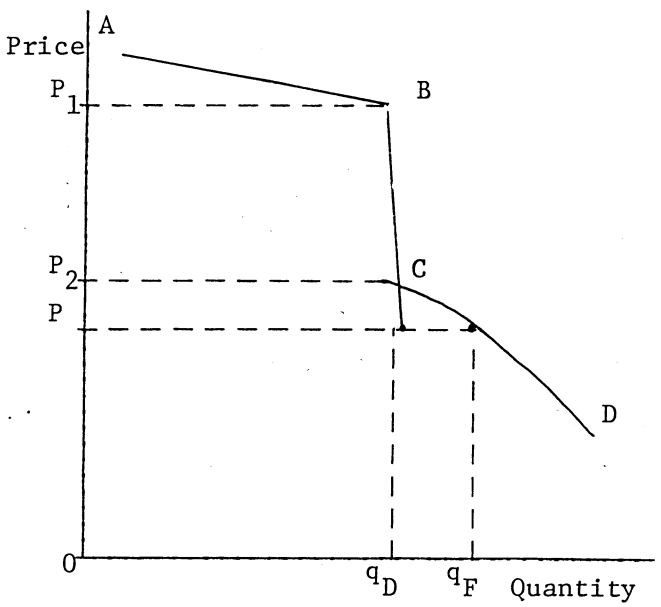

Figure 1: Domestic and Foreign Demand for Ontario Tobacco

in figure 1.[1]

The domestic demand, as indicated by the slope of BC, is not very responsive to price changes, since tobacco consumption is determined largely by habits and has few substitutes.[2] At prices higher than P_1, however, the 20-30 cent per pound tariff would no longer protect against imports.[3] If foreign tobaccos were perfect substitutes, no Ontario tobacco would be purchased if its price was above P_1. Continuity in blends, however, dictates that limited amounts of Ontario tobacco be purchased, and consequently, section AB of the demand function is very responsive to price changes. Conversely, at prices lower than P_2, Canadian tobacco is competitive with foreign flue-cured tobacco in the world market. Ontario has consistently been on an export basis for flue-cured tobacco.

The slope of the section CD represents the price-quantity response of the export market facing Ontario tobacco growers. The nature of this demand depends both on the import demand of importing countries and the export supply of competitors. Consequently, changes in the quantity of Canadian exports affect its price via responses throughout the international tobacco market. For example, a reduction in Canadian exports tends to raise not only its price but also the prices of

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[1] These market relationships are adapted from Campbell [2, p. 118-9].

[2] One pound of raw tobacco worth 60 cents at the farm produces about 1000 cigarettes having a 25 dollar retail value [2, p. 119]. In a perfectly competitive market with constant marketing margins, the ratio of wholesale to retail prices is similar to the ratio of price elasticities. From the results of the equation on page 31, a one percent change in price will change demand .01 percent, at the farm level.

[3] Tariffs are 20 cents per pound for unstemmed tobacco and 30 cents per pound for stemmed.

all other competiting flue-cured tobaccos. The extent of these price increases depends on the importance of Canadian tobacco in the world market, on the supply response in competiting countries, and on the demand response of foreign buyers to higher prices. Since Canada supplies only five to seven percent of the World flue-cured tobacco imports and since its competitor's supply is believed to be very responsive to price changes, it is expected that changes in the quantity of Canadian exports will have little effect on its export price.

The export market effectively determines the market price for both export and domestic consumption of Ontario flue-cured tobacco.[1] When the level of tobacco production is Q_F (figure 1), the price for tobacco, whether for the domestic or export market is P, the quantity demanded for the domestic market being Q_D and the balance, $Q_F - Q_D$, being exported. The importance of the export market, therefore, makes analysis of the export demand function crucial to the appraisal of the market for Ontario tobacco.

The argument that the volume of Canadian tobacco exports is not responsive to price changes might be challenged on the grounds that tobacco manufacturers in importing countries, like the U.K., are reluctant to change supply sources for reasons of continuity in blending, multi-national firms, etc. Consequently foreign buyers would bid up prices of Canadian flue-cured tobacco when the quantity available is reduced and conversely, would require a large price reduction to purchase any additional quantities. As an empirical test of this issue, the substitutability of Canadian for U.S. and for Indian flue-cured tobacco was examined. On

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[1] This is the situation unless price discrimination exists. The export promotion levy of one cent per pound for 1972 provides a slight price differential between markets.

the basis of the volumes and prices of tobacco imports into the U.K., the principal market, estimates were made of the elasticity of substitution between the Canadian and each of the two other tobaccos. The results indicated that if the ratio of U.S. to Canadian prices were to increase by 1 percent, the ratio of U.S. to Canadian tobacco imports into the U.K. would decline by 1.56 to 1.71 percent. In other words, the estimates show that Canadian and U.S. flue-cured tobaccos are close substitutes and that a decrease in the Canadian price relative to the U.S. price would increase Canada's share of the U.K. market at the expense of the U.S. share. Similar estimates with respect to Indian tobacco yielded an elasticity of substitution of 0.86, indicating that tobaccos from that source substitute less readily for Canadian flue-cured in the U.K. market.[1]

A direct test of the nature of the export demand relationship was provided by statistical estimation, using multiple regression analysis. The export price for Canadian flue-cured tobacco was expressed as a function of its export volume, the world price level as measured by U.S. export price, and a dummy variable to account for possible structural changes resulting from trade sanctions imposed upon Rhodesia.

This function, shown below, was estimated by ordinary least squares using time series data for the 1952-70:

$$Y_1 = -3.14 - \underset{(0.21)}{0.08}\ X_1 + \underset{(0.14)^{**}}{1.00}\ X_2 + \underset{(4.51)^{**}}{18.27}\ X_3$$

$$R^2 = 0.97$$
$$DWS = 2.03$$

**coefficients are significantly different from zero at the one percent level.

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[1] Appendix 2 contains an elaboration of the theory of this concept, the empirical results and a further discussion of the implications of this analysis.

where: Y_1 is the value per pound of Canadian flue-cured tobacco exports to the U.K., calendar years, Canadian cents.

X_1 is the volume of Canadian flue-cured tobacco exports, million pounds.

X_2 is the value per pound of U.S. flue-cured tobacco (types 11-14) exports, calendar years, Canadian cents.

X_3 is a dummy variable to account for trade sanctions against Rhodesia, taking a value of zero prior to 1966 and unity thereafter.

These results indicate that variations in Canadian export prices have been almost entirely explained by changes in world prices and that changes in the volume of Canadian exports have had no statistically significant effect on Canadian export price. Trade sanctions against Rhodesia was estimated to raise Canadian prices by 18 cents per pound, while a 1 cent change in U.S. export prices brought about an equal change in Canadian prices. On the basis of the estimated relationship, a 1 percent increase in Canadian exports would result, on average, in a 0.04 percent decline in its export price.[1]

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[1] This value can be verified using an indirect formula for price flexibility

$$f = \frac{a}{n + (1-a)e}$$

where f is Canadian export price flexibility
a is Canada's share of the world market
n is world price elasticity of demand
e is world price elasticity of supply

If n is 0.1 and e is 2.0, then f is .04.

These conclusions obviously have extremely important implications for Canadian tobacco marketing strategy.

3. SUPPLY CONTROL OF ONTARIO TOBACCO

3.1 Method of Control

Production of flue-cured tobacco in Ontario has been curtailed through acreage controls since the formation of the Ontario Flue-Cured Tobacco Marketing Association in 1936. This organization was voluntary and its membership included most growers and buyers. Association growers accepted acreage restrictions despite the existence of independent, non-regulated growers. This situation coupled with a suspicion that buyers were discriminating among producers led to the formation of the Flue-Cured Tobacco Grower's Marketing Board in 1957. Comprised of only producers, the Board became the monopoly sales agent for tobacco under the authority of the Ontario Farm Products Marketing Act, with the right to determine and allocate quotas.

Each year, the Board announces the percentage of producers' basic acreage that can be grown. Marketable acreages have ranged from 50 percent of basic acreage in 1964 to 90 percent in 1967 (Table 14). Although the Board may attempt to meet some target volume of production, supply control through acreage restrictions is complicated by the unpredictability of yields per acre. First, producers may compensate for decreased acreage by substituting other types of inputs such as fertilizer, herbicides, irrigation, etc., and as the price of tobacco increases it becomes profitable to do so. Indeed, with rising tobacco prices, average yields increased by 22 percent between 1957-61 and 1965-69. Consequently, the Board must continually reduce acreages just to maintain a constant output. Secondly and probably more important, weather, managerial and possibly other factors lead to considerable fluctuations about this upward trend.

TABLE 14. Marketable Acreage of Ontario Flue-Cured Tobacco Expressed as a Percentage of Basic Acreage, 1958 to 1971

Year	percent	Year	percent
1958	87.5	1965	55
1959	77.5	1966	82.5
1960	87.5	1967	90.2
1961	82.5	1968	81.5
1962	79	1969	79
1963	67	1970	61.5
1964	50	1971	54.4

Source: Annual Reports, Ontario Flue-Cured Tobacco Growers' Marketing Board, 1963 to 1971, inclusive.

3.2 Effects of Supply Control

The rationale for any supply control program is to raise producer net income through higher prices and to stabilize production and grower returns. By reducing the quantity supplied to the market, higher prices would be generated from the competitive bidding of buyers. The adoption of the 'dutch-clock' auction, in place of barn buying after the formation of the Tobacco Board, was intended to ensure the latter. This market is also protected against import substitution by a 20-30 cent per pound tariff, as well.

The success of this strategy in raising producer returns, hinges on the magnitude of the price increase induced by a given reduction in supply. At one extreme, if purchases are determined largely by habit, continuity constraints, or other non-price factors then

a small reduction in supply would result in considerable bidding up of price. At the other, if buyers can purchase freely in any market, then small changes in quantity supplied in one market would have no impact on the prices buyers would offer.

To evaluate the overall impact of the Tobacco Board's supply control program, it is necessary to consider which groups benefit and which are penalized by this type of policy. On the demand side, tobacco is purchased for processing and eventual sale to consumers both in Canada and abroad (notably in the U.K.). An increase in tobacco prices exacted by Ontario producers potentially would increase costs to marketing firms, and/or Canadian and foreign consumers. On the supply side, producers owning production rights would receive all of the price increase benefits.[1]

Costs identified on the demand side can be considered in the aggregate (i.e. without regard to distribution of costs among the groups). These "buyer costs" can be classified into two components: (A) the increase in the cost of the quantity purchased and (B) the reduction in the quantity purchased. Components A and B are illustrated in figure 2.

The allocation of net benefits to growers is more complicated. In the simple case, acreage allotments are not assumed to affect the volume of inputs used (say, fertilizer to increase yields). Growers do receive a higher price, but for a lower output. The additional revenue from the higher price is represented by area A in figure 2. They lose the net returns however, from the units of curtailed output as represented by area C.

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[1] This allocation is oversimplified as there are many other groups who are also affected such as foreign producers who would become more price competitive and non-tobacco producers who are penalized by not being able to grow the higher valued crop.

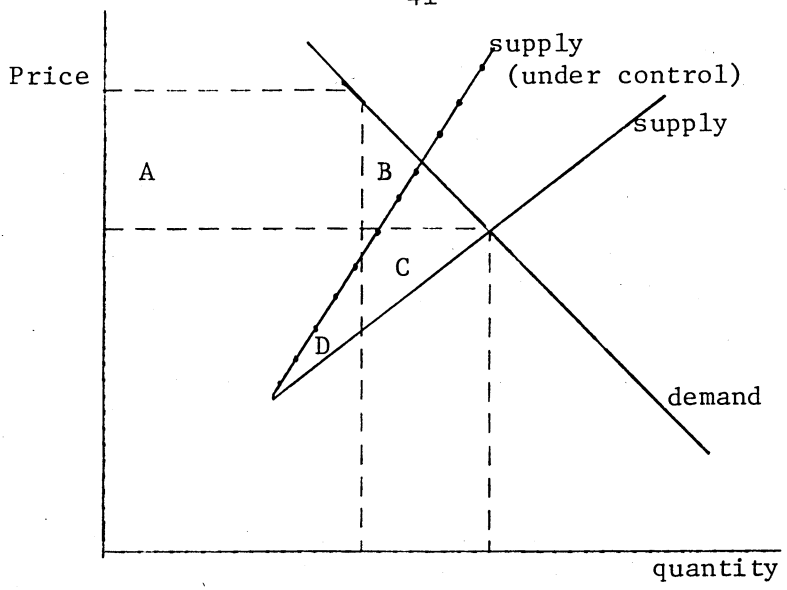

Figure 2: Supply and Demand for Ontario Tobacco

Therefore, in order for this program to benefit producers, area A must be larger than C. Area A, the gain, is smaller (larger) the less (more) responsive buyer prices are to decreases in output. Area C, the loss, is smaller (larger), the less (more) responsive growers output is to price increases. If buyer prices are not increased by a reduction in supply, there is no producer gain (i.e. A equals zero). If producers do not increase output regardless of price, there is no producer loss (i.e. C equals zero).

The estimation of net producer benefits is more complex if reduction in marketable acreage stimulates producers to substitute other inputs for land. While financially rational because of the higher tobacco prices, costs of production are nevertheless above those prevailing in the unrestricted case. If under even greater acreage restrictions, output is kept to the same

level, producers incur additional losses as represented by area D in figure 2.

3.3 The Empirical Results

The export sector of the tobacco market was shown to determine the price for tobacco in either the domestic or export markets (figure 1). The estimated Canadian export demand function indicated that changes in the export volume had no significant effect on export prices.[1] Under these conditions, the demand function in figure 2 can be represented by a perfectly horizontal line.

The apparent "decision-rule" employed by the Board to determine the marketable acreage is the level of the previous period's price. In general, these lagged prices would bear limited correlation to current prices. These relationships are illustrated in Table 15 which shows the annual percentage changes in marketable acreage and the corresponding change in the previous period's price. In 12 of the 14 years (1958-71) a decrease (increase) in price from the previous year led to the Board decreasing (increasing) the marketable acreage in the following year. In only 5 years of the 13, however, did current prices increase (decrease) when marketable acreage was decreased (increased).

This evident lack of success on the part of the Board in influencing tobacco prices is entirely consistent with the conclusions regarding the nature of the demand for Ontario tobacco. It was found that the grower price was determined primarily by prices in the world market and not significantly by variations in the Ontario output of tobacco; indeed results essentially similar to those of the export demand equation were found when Ontario

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[1] See equation on page 35.

tobacco grower prices were expressed as a function of Ontario tobacco output and U.S. export price.[1]

In terms of the benefits and costs of the supply control program, these results carry very enlightening implications. If the demand curve facing Ontario tobacco growers is perfectly horizontal, there are no "buyer costs" as areas A and B collapse to zero. Similarly, there are no gains to producers from the program. The magnitude of the loss to producers, area C, depends on the producer response to price, as well as on the market equilibrium price and quantity values.[2]

The control of tobacco production in Ontario precludes the statistical estimation of a conventional producer supply response function. Since adequate supplies of land suitable for tobacco production, and managerial talent exist, it is assumed that producers are very responsive to price, i.e. a one percent change in price probably generates at least a one percent change in supply. A linear programming study by Trant and Klossler [28] estimated tobacco prices would decline to 33 cents per pound before producers would switch to alternate crops. Allowing for subsequent general price inflation and the greater risk and managerial talent required for tobacco production, a price of 40 cents per pound might be more appropriate. It was also assumed that recent supply control conditions are typical, that is total production would be approximately 200 million pounds, with exports of 50 million pounds and a grower price of 65 cents.[3] Using these values, the unrestricted equilibrium output was estimated to be 325 million pounds,

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[1] This equation is shown in Appendix 3.

[2] Appendix 4 presents a formula for the derivation of the size of area C.

[3] These are similar to average values for 1966-70 which are respectively 207 million lbs., 50 million lbs., and 68 cents.

TABLE 15. Relationship of Changes in Marketable Acreage, Lagged Price and Current Price from the Previous Year Prices

Crop Year	Change Relative to Proceeding Year in: Marketable Acreage	Lagged Price	Current Price
	%	¢/lb.	¢/lb.
1958	-12.5	+3.0	-2.5
1959	-11.4	-2.5	+9.0
1960	+12.9	+9.0	-1.0
1961	-5.7	-1.0	-3.0
1962	-4.0	-3.0	-0.5
1963	-15.2	-0.5	-5.0
1964	-25.4	-5.0	+10.0
1965	+10.0	+10.0	+9.0
1966	+50.0	+9.0	+6.5
1967	+9.3	+6.5	-2.0
1968	-9.6	-2.0	+2.0
1969	-3.1	+2.0	-5.0
1970	-23.4	-5.0	-1.0
1971	-11.5	-1.0	NA

of which almost all of the additional 125 million pounds would be exported. At 1970 yields, this volume would be produced on 150,672 acres, or just slightly less than the basic tobacco acreage.[1] At the equilibrium output of 325 million pounds, the magnitude of area C in figure 2 is $15.63 million.[2] This is an annual loss in net income from producing at the recently controlled levels (200 million pounds) rather than using all of the basic tobacco acreage.

[1] Basic tobacco acreage was 151,784 acres, June 8, 1971. 1971 Annual Report of Ontario Flue-Cured Tobacco Growers' Marketing Board.

[2] These calculations are shown in Appendix 4.

These conclusions sharply contrast with the acclaim generally accorded the Tobacco Board for its supply control policy which in terms of increased grower prices, increased quota values and market stability has been considered highly successful. Examination of each of these areas of performance, however, fails to refute the conclusions of this study.

Ontario tobacco producer prices have increased during the existence of the Board by an annual average of 1.8 cents per pound. But as the analysis of the export demand for tobacco revealed, world supply-demand conditions were almost entirely responsible for this increase so that similar improvements in grower price could have been expected in the absense of a supply control program. The increase in the value of tobacco production rights can be attributed legitimately to the Board. This gain in value, however, merely reflects the widening discrepancy between the market price for tobacco and the price level at which growers would have been willing to grow the controlled volume of tobacco. Any program which restricts output below the level which producers would otherwise supply for a given market price, invariably will make the right to produce that output valuable. Rental rates of $350 per acre for the right to produce tobacco imply an opportunity cost of approximately 20 cents per pound, slightly lower than that obtained from the Trant-Klossler study.

The argument that the Board has improved stability in the tobacco sector is difficult to support. Stability of net income is probably the most crucial factor in long term producer planning and it is possible to analyze the Board's affect on this variable. Net income is the product of tobacco prices, yields and acreages, less production costs. It has already been shown that the Board does not have a significant impact on prices. In fact, the annual price variation during the Board's history actually exceeded that occuring

under the Tobacco Association (1936-57).[1] Yields and costs are not controlled by the Board and there appears to be no reason to expect that its policies have had any affect on their stability. Acreage is controlled by the Board, but marketable acreage has been varied so much from year-to-year it seems unlikely that acreage fluctuation has been diminished by the Board's programs. Consequently, it appears that the Board may have, if anything, actually increased the instability of tobacco producers' net income. Only in the sense that licensing of growers has reduced the number of "in and outers", can the contribution of the Board to stability in the industry be demonstrated. Individual producers may feel less uncertainty under the existing marketing structure than they would if the Board did not exist, but such a contribution to stability is impossible to assess.

A critical issue pertaining to the Board's future export strategy is the nature of the demand function for Canadian tobacco when exports are expanded beyond those levels previously attained. While the export price was found to be unresponsive to variations in exports, the demand function is unlikely to maintain this form as exports are increased ad infinitum. Specifically, the concern is that if Ontario increased tobacco production by 125 million pounds, most of which would be exported, would prices be depressed to unacceptable levels?

The immediate reaction of any sizeable increase in Canadian exports would be a deflating of price as

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[1] Price variability can be estimated using the standard error of the estimate from a time trend equation, divided by the average price. Annual percentage price variation during 1937-57 was 9.4 while during 1958-70 it was 10.0 (Appendix 3).

buyers are hesitant to greatly expand purchases, without large price discounts on account of uncertainties over long-run continuity of supply, technical blending constraints, lack of adequate market information, etc. Consequently, if Ontario increased tobacco production by 125 million pounds in a single year, undoubtedly its price would drop sharply while creating a disruptive situation in the world tobacco market. Over a longer period, buyers would adjust to making additional purchases of Canadian tobacco at competitive world prices. To avoid such a chaotic market situation, a rational transitional period of at least 5 years would be required to shift from recent production levels to 100 percent of basic tobacco acreage. During this period, an annual increase in exports of 25 percent would be required. Canada has experienced as large as these rates of increase in exports without price declining below estimated levels.[1] Moreover, to offset possible short-run price declines from increasing exports, an extensive promotional and information program is essential.

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[1] For example, exports increased 47 percent between 1954 and 1955, 37 percent from 1960 to 1961 and 25 percent between 1956 and 1957 and between 1963 and 1964.

4. CONCLUSIONS AND RECOMMENDATIONS

The most significant finding of the study is that the Tobacco Board's production control policy appears to have been ineffective as a means of increasing prices to tobacco producers. The evidence indicated that Ontario tobacco prices have been determined primarily by the level of prices on the world market and that the variations in Ontario production have had no significant impact on price. Grower prices have tended to rise during the period of the Board's tenure, but these increases would have occurred in the absence of supply control in response to world market conditions.

Clearly this conclusion is of critical importance to Ontario tobacco producers. The acreage control measures not only failed to enhance producer prices, they imposed losses in the form of earnings foregone because of the production restrictions. Moreover, the curtailment of Ontario's production may have promoted production in the Maritimes while at the same time obviated the need for aggressive export market development, thus jeopardizing Ontario's ability to fulfill its competitive potential in international markets for tobacco. It is difficult to be very optimistic about the emerging world demand prospects for Ontario Tobacco. The major market, the U.K., is likely to import less flue-cured tobacco, due to three distinct factors: (i) the declining rate of cigarette consumption and lower tobacco content of cigarettes; (ii) a different demand-supply structure after its EEC entry; and (iii) the increasing competition from small producers and anticipated lifting of the Rhodesian trade santions. Moreover, the largest importing region, the EEC, may reduce its tobacco requirements because of preferences given to expanded domestic prodution and associated exporting regions.

These world market conditions would suggest that Ontario may no longer enjoy the recent luxury of an expanding export volume coupled with higher prices. Regardless of Board actions, market prices are likely to decline. If the Board reacts to such a price decline by reducing marketable acreage, as it has consistently done in the past (Table 15), this would only further aggravate the reduction in producer income occasioned by the price decline. Whether or not world prices drop, the logical strategy for the Board is to relax acreage controls gradually and permit an increase in tobacco production.

The relaxation of acreage controls might carry an added bonus in the form of improvements in tobacco quality. The U.S. acreage controls have lead to an increase production per acre and a corresponding reduction in tobacco quality. If production control in Ontario is to persist, the Board should examine whether or not acreage control is the most desirable method for supply reduction. Low quality Canadian tobacco has actually decreased in price while average prices have increased by 30 percent during 1963-70.

From the point of view of growers' incomes, a two-price system whereby domestic prices exceed export prices definitely warrants further investigation as to its operational and political feasibility. All the necessary economic ingredients exist for successful separation and exploitation of these two markets -- export price elasticity greatly exceeds domestic price elasticity, re-imports of Canadian tobaccos are discouraged by high tariffs, and institutions exist to effectively segment the markets. Recently, a first step was taken through a modest one cent per pound levy on domestic sales to finance export promotion.

The Ontario Flue-Cured Tobacco Growers' Marketing Board has indeed made an important contribution to improving the structure and performance of the market

for Ontario unmanufactured tobacco. This is unquestionable a vital area and one in which the Board should continue to strive for further improvements. On the other hand, the Board, has adopted a very defensive policy with regard to production. It has been clearly demonstrated that it is essential to the welfare of Ontario tobacco producers that the Board reverse its position for an aggressive, market-oriented policy, utilizing present and possible new techniques in order to effectively compete in any world market for flue-cured tobacco. It is in these two key areas that the Board can continue to play a strategic role in the Ontario tobacco economy.

APPENDIX 1

Statistical Appendix

TABLE A.1 The U.K. Consumption of Manufactured Cigarettes and Total Manufactured Tobacco, 1950 to 1970

Year	Manufactured Cigarettes	Manufactured Tobacco, Total[1]	Cigarettes As A Percentage of Total
	Million Pounds	Manufactured Weight	Per Cent
1950	181.7	221.5	82.0
1951	190.8	228.2	83.6
1952	194.0	232.3	83.5
1953	198.6	236.0	84.2
1954	204.0	240.9	84.7
1955	211.1	246.5	85.6
1956	215.5	249.5	86.4
1957	221.3	256.0	86.4
1958	225.1	260.7	86.3
1959	230.3	266.1	86.5
1960	239.2	274.6	87.1
1961	243.1	277.7	87.5
1962	230.9	266.4	86.7
1963	237.8	273.2	87.0
1964	230.8	266.5	86.6
1965	220.7	254.8	86.6
1966	223.3	257.0	86.9
1967	221.3	255.4	86.6
1968	220.2	253.4	86.9
1969	216.5	249.3	86.8
1970	215.4	247.4	87.1

[1] Includes plain and filtered manufactured cigarettes, pipe and handrolling tobacco, cigars and snuff.

Source: Todd, G.F., Ed., Statistics of Smoking in the United Kingdom, Tobacco Research Council, Research Paper 1, 5th Edition, 1969, London, p. 13.

Commonwealth Secretariat, Tobacco Intelligence (March 71) p. 53.

TABLE A.2 The U.K. Consumption of Filtered and Total Manufactured Cigarettes, in Millions, 1950 to 1970

Year	Filter-Tipped Cigarettes	Total Manufactured Cigarettes	Filter Tipped At A Percentage Total
1950	1,710	85,145	2.0
1951	900	89,335	1.0
1952	880	90,400	1.0
1953	1,040	92,695	1.1
1954	1,550	95,230	1.6
1955	1,870	98,670	1.9
1956	3,050	99,560	3.1
1957	5,370	102,250	5.3
1958	9,700	104,020	9.3
1959	12,900	106,600	12.1
1960	17,500	110,900	15.8
1961	22,100	113,400	19.5
1962	28,600	109,900	26.0
1963	37,800	115,200	32.8
1964	47,800	114,400	41.8
1965	59,400	112,000	53.0
1966	71,300	117,600	60.6
1967	78,500	119,100	65.9
1968	86,100	121,800	70.7
1969	94,300	124,900	75.5
1970	100,100	127,900	78.3

Source: "Statistics of Smoking in the United Kingdom", pp. 14-15.

Tobacco Intelligence (1971).

TABLE A.3 Shipments of Canadian Cigars, Cigarettes and Cigarettes per capita, 1947-70

Year	Cigars	Cigarettes	Cigarettes per adult capita
	'000	'000	
1947	214,745	15,687,127	1740.6
1948	210,335	16,021,779	1757.5
1949	207,213	17,053,442	1793.4
1950	198,987	17,311,062	1795.5
1951	169,408	15,816,166	1620.7
1952	201,517	18,037,368	1802.6
1953	236,248	21,156,092	2070.7
1954	240,520	22,425,791	2145.5
1955	257,233	24,864,332	2332.7
1956	260,900	27,343,996	2518.9
1957	283,706	30,394,572	2725.1
1958	319,595	32,777,573	2876.5
1959	313,472	34,273,048	2948.1
1960	328,688	34,698,974	2930.7
1961	335,129	36,900,365	3063.1
1962	334,038	39,160,318	3190.7
1963	393,004	40,101,563	3204.8
1964	476,949	40,784,107	3188.3
1965	500,723	43,621,061	3332.8
1966	444,683	46,095,324	3434.0
1967	445,627	47,594,614	3446.0
1968	474,594[1]	46,855,322	3304.6
1969	509,763[1]	47,486,997[1]	3265.4[1]
1970	567,555[1]	50,170,229[1]	3372.3[1]

[1] Cigarette production (Tobacco and Tobacco Products Production DBS 32-014).

Source: Tobacco Product Industries, DBS 32-225.

TABLE A.4 Data Used to Estimate Retail Demand for Canadian Cigarettes

Year	Cigarette Consumption per Adult	Retail Cigarette Price Index	Disposable Income per capita
	(1)	(2)	(3)
1957	2725.1		
1958	2876.5	95.6	1339.57
1959	2948.1	101.7	1369.78
1960	2930.7	104.4	1403.18
1961	3063.1	104.2	1426.19
1962	3190.7	104.6	1519.82
1963	3204.8	104.6	1585.65
1964	3188.3	105.5	1644.63
1965	3332.8	108.9	1781.20
1966	3434.0	113.6	1912.46
1967	3446.0	118.6	2044.05
1968	3304.6	133.1	2167.56
1969	3265.4	139.5	2400.50
1970	3372.3	141.5	2638.42

Source: (1) DBS. Tobacco Product Industries, 32-225.

(2) DBS. Prices and Price Indices, 62-002.

(3) DBS. Canadian Statistical Review, 11-003.

TABLE A.5 Data Used to Estimate U.K. Retail Demand for Cigarettes

Year	Retail Price (pence per pack)	Per capita Income (pounds)	Cigarette Consumption per adult
	(1)	(2)	(3)
1949	35	202.7	2,110
1950	35	211.4	2,180
1951	36	231.4	2,300
1952	36	250.4	2,320
1953	36	271.2	2,370
1954	36	286.0	2,430
1955	37	302.7	2,510
1956	39	326.8	2,530
1957	40	344.7	2,590
1958	40	360.7	2,620
1959	40	374.1	2,670
1960	42	397.6	2,760
1961	46	423.1	2,800
1962	46	437.7	2,680
1963	46	462.9	2,790
1964	50	494.3	2,750
1965	55	522.0	2,680
1966	55	538.5	2,810
1967	55	577.5	2,830
1968	62	604.2	2,890
1969	57[1]	627.1	2,941
1970	58[1]	682.3	2,993

[1] Estimated from time trend equation, Appendix 4.

Source: (1) Correspondence with Dr. C.E.D. Smith, Leaf Dept., Imperial Tobacco Group Limited, Bristol, England.

(2) United Nations, Statistical Yearbooks.

(3) Todd, G.F., (ed.), Statistics of Smoking in the United Kingdom, p. 23.

TABLE A.6 The United Kingdom: Total Consumer Expenditure on Tobacco, 1957 to 1968, at Current Prices in Millions of Pounds Sterling

Year	Expenditure on Tobacco
1957	981
1958	1,031
1959	1,061
1960	1,140
1961	1,217
1962	1,242
1963	1,286
1964	1,343
1965	1,428
1966	1,504
1967	1,512
1968	1,578
1969	1,694
1970	1,790

Source: Commonwealth Secretariat, Tobacco Intelligence.

TABLE A.7 Ontario Tobacco Grower Average Prices

Year	Price	Year	Price
	(cents per pound)		(cents per pound)
1925	33.00	1948	42.70
1926	45.00	1949	42.25
1927	33.90	1950	44.72
1928	31.00	1951	46.44
1929	29.00	1952	41.61
1930	32.00	1953	43.77
1931	20.50	1954	43.21
1932	16.30	1955	45.48
1933	19.50	1956	46.30
1934	24.70	1957	49.29
1935	27.50	1958	46.57
1936	29.30	1959	55.57
1937	27.30	1960	54.65
1938	22.65	1961	51.70
1939	20.30	1962	51.04
1940	20.80	1963	45.81
1941	22.80	1964	55.63
1942	26.50	1965	64.69
1943	30.21	1966	71.36
1944	30.74	1967	69.08
1945	34.90	1968	71.28
1946	36.67	1969	66.36
1947	37.34	1970	65.12

Source: MacGregor and Klossler [16, p. 84]
ODAF Agricultural Statistics for Ontario.

TABLE A.8 Data Used in Canadian Export Demand Equation

Year	Canadian export price	U.S. export price	Canadian exports
	(1) cents per pound	(2) (Can.) cents per pound	(3) million pounds
1952	58.6	61.3	37.3
1953	56.0	65.1	27.3
1954	58.5	66.6	30.9
1955	57.9	67.3	45.5
1956	61.3	63.9	28.5
1957	61.5	71.8	35.7
1958	66.2	71.5	27.7
1959	66.3	71.5	37.9
1960	72.6	76.9	34.5
1961	73.9	82.8	37.4
1962	75.5	87.2	46.8
1963	83.7	88.8	35.6
1964	81.7	88.4	48.7
1965	92.2	91.5	38.9
1966	106.2	100.0	35.6
1967	118.9	101.9	41.3
1968	122.9	103.7	46.4
1969	121.5	111.4	51.1
1970	117.7	114.2	47.4

Source: (1) DBS. Trade of Canada.

(2) USDA. Annual Report on Tobacco Statistics, Consumer and Marketing Services (for 1952-66).

_____ Foreign Agricultural Trade (1967-70).

(3) Commonwealth Secretariat, Tobacco Intelligence.

TABLE A.9 Data Used to Estimate Tobacco Demand Equation, at Grower Level

Year	Ontario Grower Price	Ontario Production	U.S. Export Price
	(1) cents per pound	(2) million pounds	(3) (Can.) cents per pound
1952	41.61	127.435	63.01
1953	43.77	127.394	65.54
1954	43.21	167.988	66.81
1955	45.48	112.202	66.17
1956	46.30	143.862	66.50
1957	49.29	147.973	71.08
1958	46.57	176.322	71.83
1959	55.57	146.675	72.01
1960	54.65	199.521	75.98
1961	51.70	190.164	83.16
1962	51.04	180.080	88.11
1963	45.81	180.297	87.92
1964	55.63	136.641	90.30
1965	64.69	154.032	94.76
1966	71.36	214.703	100.42
1967	69.08	195.895	100.36
1968	71.28	200.428	101.97
1969	66.36	226.306	105.15
1970	65.12	199.006	108.40

Source: (1) ODAF Agricultural Statistics for Ontario.

(2) ____ Agricultural Statistics for Ontario.

(3) USDA. Tobacco Situation (for years 1952-63).

_____ Foreign Agricultural Trade (for years 1964-70).

APPENDIX 2

Elasticity of Export Substitution

In order to identify the effectiveness of price as a means of expanding Canada's market share, an analysis was made to discover the extent of the relationship between relative prices and relative quantities between Canada and its two major competitors in the U.K. market -- India, and the U.S. An elasticity of substitution demand, defined as the change in the ratio of the volume of exports from two countries brought about by a change in their price ratio, was developed to indicate the relationship.[1]

In this analysis, the price data used was exclusive of the U.K. tariffs since these are fixed amounts and hence do not affect changes in the price ratio. Data were only available for average prices and total quantities with no separation into grades.[2] Hence, the results need to be interpreted with care because of this aggregation limitation of the price data. The implicit assumption is that composition of imports into the U.K. from different sources were comparable with respect to quality over the period. The form of the equation was:

$$\log (Q_A - Q_B) = K + Z \log (P_a - P_B) + b \log t \qquad (1)$$

where Q_A, Q_B = are quantities demanded from Country A and B.

P_A, P_B = are prices of Country A and B exports

K = is a constant.

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[1] The theoretical development of the elasticity of substitution can be obtained from S.M. Smith, [23, p. 76-82]; J. Polak, [19, p. 16-20]; R.E. Capel, [6]; K.W. Meinken, A.S. Rojko, and G.A. King [15, p. 711-35] or H. Schultz, [22, p. 621].

[2] Data source was Tobacco Intelligence, 1960-1970 issues.

Z = is the coefficient of the elasticity of substitution.

b = is coefficient of the time variable.

t = is time.

The results of the empirical estimation were as follows:-

$$\log \frac{Q_I}{Q_c} = 0.23 - \underset{(0.33)}{0.86} \log \frac{P_I}{P_c} - \underset{(0.06)}{0.20} \log t \qquad (2)$$

$R^2 = 0.70$

where Q_c, Q_I = quantities of stripped and unstripped flue-cured tobacco imported annually by the U.K. from Canada and India, respectively 1960 to 1969, in pounds, dry weight.

P_c, P_I = average annual prices of stripped and unstripped flue-cured tobacco imported by the U.K. from Canada and India respectively 1960-69 in U.S. cents per pound.

and $t = 1$ for 1960, etc.

The multiple correlation coefficient indicates that 70 per cent of the variation in the ratio of quantities imported by the U.K. was explained by the two independent variables. Both coefficients were significant at the 95 per cent confidence level.

$$\log \frac{Q_{us}}{Q_c} = 0.03 - \underset{(0.88)}{1.56} \log \frac{P_{us}}{P_c} + \underset{(0.09)}{0.50} \log t \qquad (2a)$$

$R^2 = 0.76$

where Q_{us}, Q_c = quantities of flue-cured tobacco imported annually by the U.K. from the U.S. and Canada, respectively for the period 1959 to 1969 in pounds, dry weight.

P_{us}, P_c = average annual prices of flue-cured tobacco imported by the U.K. from the U.S. and Canada respectively for the period 1959 to 1969, in U.S. cents per pound.

and t = time trend, $t = 1$ for 1959.

$$\log \frac{Q_{us}}{Q_c} = \underset{}{2.11} - \underset{(0.68)}{1.71} \log \frac{P_{us}}{P_c} - \underset{(0.45)}{1.35} \log t \qquad (2b)$$

$$R^2 = 0.71$$

where the variables are the same as defined above but data used was only for the period 1963 to 1969.

Equations (2a) and (2b) indicate the elasticities of substitution for the periods 1963 to 1969 and 1959 to 1969. In equation (2b) the coefficient was found to be significant at the 95 percent confidence level, and 71 percent of the variation in the dependent variable was explained by the independent variables; in equation (2a) the coefficient was found to be significant at the 75 percent confidence level, and 76 percent of the variation in the dependent variable was explained by the regression.

The result obtained for India indicates that, if Canadian prices were to decline such that the ratio of Indian to Canadian prices increased by one percent, there would be an increase in imports of tobacco to the U.K. from Canada such that the ratio of Indian to Canadian exports declined by 0.86 percent. This indicates

that changes in relative prices induce less than proportionate changes in relative quantities, implying that tobacco from India and Canada is substitutable to only a limited extent. When prices change manufacturers must still maintain a certain level of imports from each country as the tobacco is not perfectly substitutable and efforts must be made to ensure continuity of blends.

Considering the second result obtained, as could be expected, a greater degree of flexibility exists between flue-cured tobacco imports from Canada and the U.S. A one percent fall in the ratio of prices will lead to a 1.56 percent rise in the ratio of quantities for the period 1959 to 1969, and a 1.71 percent rise for 1963 to 1969, indicating that potential exists for Canada to become a replacement for expensive American tobacco. Both countries produce high quality leaf and are both reliable supply sources with respect to continuity. Because of the nature of manufactured cigarette consumption and the overwhelming popularity of filter-tipped cigarettes, manufacturers have increasing freedom to vary their supply sources according to price, and this is displayed between the two North American countries. A further feature of this result is that the estimated value of the elasticity of substitution is greater for the period 1963 to 1969 than for 1959 to 1969, indicating that the degree of flexibility of U.K. importers has apparently risen during this period.

The conclusions reached by this analysis are of extreme importance in their implications for the Canadian flue-cured tobacco industry. It is clear that export demand for Canadian tobacco in the U.K. as a substitute for U.S. tobacco is relatively elastic, because a small percentage change in the price ratio of Canadian and U.S. tobaccos will induce a more than proportionate change in the ratio of quantities imported by the U.K.

It is necessary to recognize the limitations of these results. The elasticity of substitution was generated for observations involving small changes in relative prices and exports. Consequently, it is not possible to assume the estimated value of the elasticity of substitution to be constant over large changes in relative prices and/or exports. Undoubtedly, the U.S. would react to extreme price differentials which resulted in even larger losses of its share of the U.K. market.

APPENDIX 3

Results of Estimated Regression Functions

1. Trends in U.K. Tobacco Imports (from page 19)

Semi-log regressions were used to estimate time trends of unmanufactured tobacco imports into the U.K. from nine individual countries. Data were obtained from Tables 10 and 11.

The regression function was of the form:

$$\log y = \alpha + \beta t$$

where y is the estimated volume of imports, in million pounds.

α, β are regression parameters.

t is time in years, with the initial year of the period taking a value of one.

The ordinary least squares estimates of the parameters are shown in Table A.10.

2. Trends in U.K. Tobacco Consumption (from page 23)

Four regression analyses were conducted in order to estimate the time trend of various aspects of cigarette consumption: consumer expenditure on tobacco, total number of cigarettes consumed, number of cigarettes consumed per adult and the consumption of manufactured tobacco in pounds weight. Data are shown in Tables A.1, A.2, A.5, and A.6 for 1957 to 1970. The equations were of the following form:-

$$\text{Log } y = a + bt,$$

where y is the dependent variable,
a is the intercept term,
t is time in years,

TABLE A.10 Regression Analysis Results of Time Trends for Imports of Unmanufactured Tobacco Imports into the U.K., by Country, 1958-70

Country	$\hat{\alpha}$	$\hat{\beta}$	$S_{\hat{\beta}}$	R^2
U.S.A.	5.17	-.007	0.006	0.33
Rhodesia[1]	6.81	-0.49	0.10	0.82
India	4.55	0.005	0.006	0.27
Canada	4.38	0.03	0.003	0.94
Pakistan[2]	1.39	0.61	0.25	0.77
Malawi[3]	3.31	0.13	0.05	0.79
Tanzania[2]	1.62	0.60	0.28	0.73
S. Korea[4]	0.70	1.005	0.28	0.87
S. Africa[5]	3.27	0.09	0.01	0.94
Total	5.49	-0.004	0.003	0.36

[1] 1958-66

[2] 1966-70

[3] 1965-70

[4] 1967-70

[5] 1960-70

and b expresses the log of the percentage change in the dependent variable per year.

The following results were obtained from the statistical estimation

(1) $\text{Log } y_1 = 2.98 + 9.02t$ $\quad R^2 = .99$
(.005)

where y_1 = total consumer expenditure on tobacco in the United Kingdom, 1957 to 1970, in millions of pounds sterling.

t = 1 for 1957, etc.

(2) $\text{Log } y_2 = 5.01 + 0.006t$ $\quad R^2 = .96$
(0.001)

where y_2 = total number of cigarettes consumed in the U.K., 1957 to 1970, in millions.

(3) $\text{Log } y_3 = 3.41 + 0.004t$ $\quad R^2 = .88$
(0.001)

where y_3 = number of cigarettes consumer per adult (population over 15 years of age), 1957 to 1970, in numbers of cigarettes.

(4) $\text{Log } y_4 = 2.43 - 0.002t$ $\quad R^2 = .61$
(0.001)

where y_4 = tobacco consumption in the U.K. in millions of pounds, manufactured weight, 1957 to 1970.

All coefficients in the above equations were found to be significant at the one percent confidence level.

3. U.K. Tobacco Price and Income Projections 1969-1980 (from page 28)

In order to obtain projected cigarette consumption, it is necessary to estimate the future values of the predetermined variables. Price and income were projected to 1980 by means of the following equations involving a simple time trend:

$$P_t = 29.7 + 1.3t \qquad R^2 = 0.89$$
$$\qquad\quad (0.1)$$

where P_t is the average retail price per package of 20 regular cigarettes, in pence, 1949 to 1968.

t is a time trend, with $t = 1$ for 1949.

$$Y_t = 162.8 + 20.8t \qquad R^2 = 0.99$$
$$\qquad\quad (0.5)$$

where Y_t is per capita income in the U.K. in pounds Sterling, 1949 to 1968.

t is a time trend, with $t = 1$ for 1949.

Projections for price and income based upon these equations were incorporated into the major equation (p. 26) to estimate values for per capita cigarette consumption for the period 1971 to 1980 (Table 13).

4. Export Demand for Ontario Tobacco (from page 43)

A linear regression equation was estimated which related Ontario farm price for tobacco as a function of Ontario tobacco production and U.S. export prices. The function shown below was fitted by ordinary least squares for the 1952-70 period, using data from Table A.9.

$$X_1 = 5.53 + 0.01\ X_2 + 0.57\ X_3 \qquad R^2 = .79$$
$$\qquad\quad (0.05)^{2} \quad (0.11)^{**} \qquad DWS = .99$$

where X_1 is Ontario grower price for flue-cured tobacco, cents per pound.

X_2 is Ontario flue-cured tobacco production, million pounds.

X_3 is U.S. export price for unstemmed flue-cured tobacco, fiscal years, Canadian cents per pound.

This equation explained 79 percent of the variation in grower price. Level of production did not significantly affect price, while a 1 cent increase in U.S. prices lead to a 0.57 cent increase in Ontario grower prices.

A dummy variable was added to the above equation to test the affect of the Tobacco Board on grower prices. It was found that the Board has had no statistically significant affect on grower prices.

5. Trends and Variability in Ontario Tobacco Prices
(from page 46)

Linear regression equations were used to estimate annual price trends. The annual percentage variation in prices can only be obtained from these equations using the standard error of the estimate divided by the average price. These results shown in Table A.11 were obtained for three time periods (1) no acreage controls (1925-36), (ii) voluntary acreage controls (1937-57) and (iii) mandatory acreage controls (1958-70). Prices were obtained from Table A.7.

TABLE A.11 Trends and Variability in Tobacco Prices for Selected Time Periods

Period	Equations[1/]	R^2	SEE[2/]	Variation[3/]
1925-1936	P = 36.88 - 1.29t (0.63)	0.37	6.41	22.5
1937-1957	P = 20.00 + 1.45t (0.35)	0.88	3.38	9.4
1958-1970	P = 46.67 + 1.83t (0.51)	0.75	6.05	10.1

1/ Where P is average annual farm price, and t is time.

2/ Standard error of estimate.

3/ Standard error of the estimate divided by the mean of the dependent variable.

APPENDIX 4

Estimation of Loss to Tobacco Producers Under Supply Control

The loss in net income incurred by tobacco growers from producing at the controlled level (Q_o) rather than moving to a free market equilibrium level of production (Q_e), in the case of a horizontal demand function, is represented by area C (figure 3).

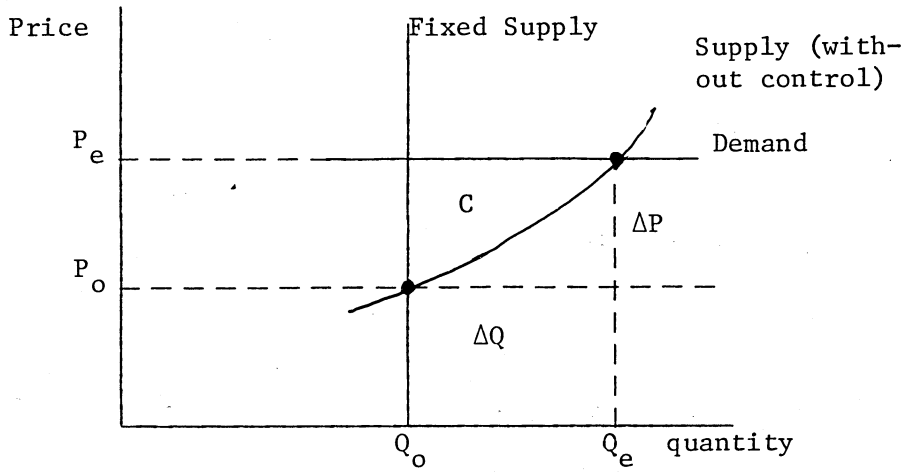

Figure 3: Magnitude of Loss to Producers Under Supply Control

The magnitude of area C can be approximated by the formula:

$$C = \tfrac{1}{2}\Delta P \Delta Q \qquad (1)$$

if r is the percentage change in price, and
e_s is the percentage change in quantity from a one percent change in price.

then, $r = {}^{\Delta P}/_{P_o}$, and (2)

$$e_s = \left({}^{\Delta Q}/_{\Delta P}\right)\left({}^{P_o}/_{Q_o}\right) \qquad (3)$$

$\therefore$ from (2), $\Delta P = r P_o$ (4)

$\therefore$ from (3), $\Delta Q = r Q_o e_s$ (5)

$\therefore$ from (4) and (5), $C = (\frac{1}{2}) r^2 P_o Q_o e_s$ (6)

if, $P_o = \$.40$

$P_e = \$.65$

$Q_o = 200$ (million pounds)

$e_s = 1$

then, $C = (\frac{1}{2}) (.625)^2 (.40) (200) (1)$
$= \$15.625$ million

and, $\Delta Q = (.625) (200) (1)$
$= 125$ million pounds

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notes