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Free-Riding on Federalism: Trade Protection and the Canadian Dairy Industry

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Cet article examine le lien qui existe entre le fédéralisme, la recherche d'un partage de la rente et la pratique de la resquille. En utilisant les données fournies par l'industrie laitière canadienne, nous testons quatre hypothèses concernant les causes déterminantes des dépenses qu'entraîne la recherche d'un partage de la rente et le rôle de la resquille. Nous constatons premièrement que les provinces ne coopèrent pas entre elles lorsqu'il s'agit de faire pression sur le gouvernement pour obtenir une protection commerciale. Deuxièmement, nous découvrons que certaines provinces profitent des dépenses faites par les plus grandes provinces (qui sont plus influentes) pour la recherche d'un partage de la rente. Troisièmement, le coût de la recherche d'un partage de la rente s'accroît lorsque le gouvernement fédéral est obligé de prendre une décision quant à l'avenir des politiques protectionnistes. Quatrièmement, les changements institutionnels dûs au GATT ont augmenté le coût de la resquille pour maintenir les politiques protectionnistes.

This paper examines the link between federalism, rent-seeking and free-riding behaviour. Using data from the Canadian dairy industry, we test four hypotheses of the determinants of rent-seeking expenditure and the role of free-riding. First, we find that provinces do not cooperate with each other when lobbying the federal government for trade protection. Second, some provinces are found to free ride on the rent-seeking expenditure of the larger (more influential) provinces. Third, the cost of rent-seeking increases when the federal government is forced to make a decision regarding the future of the protectionist policies. Fourth, institutional changes under the 1994 GATT raised the rent-seeking cost of maintaining protectionist policies.

The dairy industry is one of the most highly protected sectors of Canadian agriculture (Schmitz, Furtan and Baylis 2002). This protection is partly the result of rent-seeking by the provincial dairy boards (i.e., dairy producer organizations) (Vercammen and Schmitz 1992). The dairy sector

lobbies the federal government to maintain the supply management system and tariff protection from dairy imports. This lobbying takes many forms, including the formation of a group of Liberal members of Parliament who support the dairy sector (Wilson 2003).

In a country with only one level of government, all rent-seeking would occur at the national level. If the lobby groups were well organized, they would spend resources on lobbying up to the point where the expected marginal benefit equals the marginal cost of lobbying. However, in countries where power is decentralized, many lobby groups (including regional governments) will be the primary lobbyists for national policies, which can lead to collective action problems. When provinces or provincial groups lobby the federal government in support of a national policy, the provincial agents may bid against each other, they may cooperate, or, some provinces may free ride on the lobby expenditure of others. Using data from Canadian provincial dairy marketing boards, we examine whether their activities suffered from free-riding, and ask how a change in institutions affected the rent-seeking expenditure. We find that Canadian federalism may encourage free-riding between provinces.

In this paper we test four separate hypotheses. We start by examining the hypothesis that provincial groups may coordinate with each other when lobbying the federal government, producing the optimal amount of rent-seeking (from their collective vantage). Alternatively, provinces may suffer from collective action problems where each group does not take into account the positive externalities produced by their expenditure, and collectively they underinvest. Second, we test the hypothesis that some provinces may take into account the externalities produced by their fellow lobby organizations and free ride on the expenditure of others.

There is some evidence of the potential for free-riding in rent-seeking activities. In an empirical study of rent-seeking and free-riding in the steel industry, Herander and Pupp (1991) find that expenditure on anti-dumping and countervailing duty cases does not increase with the potential benefits of the trade action, from which they conclude that firms have the potential for free-riding. They also find that industry segments where benefits are more

concentrated tend to contribute more. Other studies have looked at problems of collective action, some of which developed expenditure reaction functions, and found that the funding of non-excludable goods tends to suffer from free-riding (Olson and Zeckhauser 1966; Sandler 1992; Cornes and Sandler 1996). However, these studies have looked at goods such as multilateral defence or agricultural research, not rent-seeking activities. We do not know of any study that explicitly tests for free-riding in rent-seeking activities, and none that estimate reaction functions for rent-seeking expenditure. We note that the federalist framework for Canadian agriculture creates the potential for underinvestment in rent-seeking and we estimate reaction functions for provincial rent-seeking expenditure, testing whether the provinces cooperate, act independently or free ride on each other.

Last, we look at how international trade agreements have affected the rent-seeking expenditure and the relationships among the provinces. Our third and fourth hypotheses concern how a shift in trade rules affects lobbying efforts. At least twice in recent years, Canada negotiated major international agreements that might have fundamentally changed the rents to the dairy industry. The first shift was the Canada-United States Trade Agreement (CUSTA)¹ and the second was the Uruguay Round of the General Agreement on Tariffs and Trade (GATT).² Since the CUSTA left the decision of import protection for Canadian supply management industries to the 1994 GATT, there is no obvious reason why CUSTA would affect rents to dairy interests. However, the 1994 GATT shifted rents from producers to importers, adding another party bargaining for rents. Thus, our third hypothesis is that lobbying efforts increased in the two years prior to Canada signing the 1994 GATT; and our fourth hypothesis is that the level of expenditures permanently increased after the 1994 GATT was signed.

In the next section, we review some of the empirical literature on rent-seeking and free-riding. We

then provide a description of the Canadian dairy sector and we discuss why some provinces may have an incentive to free ride on the lobbying efforts of other provinces. We will present a model of rent-seeking, which we use to estimate a lobbying equation for the provincial dairy marketing boards. In the following sections, we describe our empirical results and conduct a variety of robustness experiments. We conclude that the provincial groups do not cooperate in rent-seeking (and thus underinvest), and that some provinces free ride on the lobbying expenditures of others.

THEORY OF RENT-SEEKING

If a government's objective function is to maximize public support, it may be subject to rent-seeking (Tullock 1967; Buchanan and Tullock 1974; Peltzman 1976; Becker 1983; Raussier 1992). The central thesis of rent-seeking is that individuals or groups lobby government for policies from which they will be able to obtain rent. These policies may be as straightforward as a subsidy or more complex, such as regulations that create barriers to entry into an industry. Rent-seeking requires the expenditure of resources on the part of the interest groups. These activities may take the form of directly financing a political campaign or developing a lobby group.

It may not be possible to exclude others from benefiting from the government policy being sought. The common good property of policy can lead to the potential for free-riding. If there are numerous firms in an industry bidding for common tariff protection, the other firms in the industry receive a positive externality associated with any one firm's rent-seeking expenditure. This may lead to underinvestment in rent-seeking activities. Grossman and Helpman (1996) illustrate that the higher the probability that firms can achieve protection without paying the full cost, the lower both the rent and rent-seeking expenditure (compared to a situation with no free-riding).

A number of authors have discussed the implications of free-riding in rent-seeking. Olson (1965) argues that pressure group activity is more likely to result if the group is concentrated, although the empirical results are mixed on this point. Pincus (1975) proposed that geographic concentration decreases the potential for free-riding because it facilitates coordination and monitoring. Magee, Brock and Young (1989) argue that lobbying power is a function of the concentration ratio multiplied by sales, where the concentration ratio is seen as a proxy for the possibility of rent-seeking and sales is a proxy for the portion of the benefit received by the firm.

Rent-seeking is generally seen as a wasteful activity (Tullock 1967). Interest groups or firms take resources from other productive endeavors and spend them instead on lobbying or other rent-seeking activities, decreasing overall economic efficiency. However, even with the most benign government objective — to maximize social welfare — decisionmakers rely on interest groups for information to determine the social-welfare function. There may be asymmetric information between the government and interest groups about public preferences or specific effects of certain regulations. Thus, some rent-seeking activities may actually increase overall welfare.

There has been little research to determine the factors that influence rent-seeking expenditure. Estey and Caves (1983) show that the amount of expenditure is, in large part, determined by industry structure. The authors do not find any explicit signs of free-riding, and, counter to Olson's predictions, found that the more geographically diverse the industry, the more political activity and the more success. Lopez and Pagoulatos (1996) show that Political Action Committee (PAC) contributions vary with industry structure and contributions by opponents. They do not test to see whether comparative advantage or free-riding had an influence on the size of contributions. Grossman and Helpman (1994)

show that each lobby pays according to the political strength of its rival.

There is another set of literature that has looked at the funding of public goods. Much of this work has studied national financial contributions to joint military operations (such as contributions to NATO). The findings show that there is evidence of free-riding and suboptimal distribution of the burden of military financing (for a good review of this literature, see Sandler and Hartley 2001).

The structure of Canadian federalism set in the Canadian constitution, allows provinces to free ride on each other when it comes to the federal provision of some public goods. On agricultural issues, provincial groups act like individual states when lobbying for a national policy. The legal framework for supply management is set both nationally and provincially, whereas the producer groups are organized provincially, producing an ideal crucible for interactions among players lobbying for a common goal. This paper attempts to marry the two streams of literature on rent-seeking and collective action, and empirically test problems of collective action in the funding of rent-seeking activities.

CANADIAN DAIRY SUPPLY MANAGEMENT

Canadian dairy production is regulated through production quotas, administered pricing schemes, and import tariffs. Specifically, the supply management system restricts production and allows producers to price based on the end use of the milk. Because these regulations create sizeable economic rents for producers, dairy farmers continuously lobby the government to maintain these programs. On the other side of the issue, consumer and dairy processor groups lobby for the elimination of these policies.³

To cover the administrative cost of maintaining the supply management system, each provincial marketing board charges its farmers a fixed levy on

each unit of milk production. In total, the marketing boards collected over \$28 million in levies in 1999. Some of the administration cost is to maintain the provincial supply managed system and some is for lobbying. Unfortunately, the lobbying expenditures are not fully transparent in the provincial boards' records. If administration costs for managing the system are the same across provinces, then the difference in the levy across the provinces is the lobbying expenditure. Since the shares of milk production remain constant over time, if there are economies of scale in administration, these will be captured by provincial fixed effects. Therefore we use the administrative expenditure by the provinces as a proxy, imperfect as it is, for rent-seeking expenditures. The fact that there is provincial legislation mandating that all dairy farmers belong to the marketing boards gets around the collective action problem at the provincial level. However, since the national quantity of milk produced is set at the federal level, there is the potential for collective action problems arising between the provinces when lobbying the federal government.

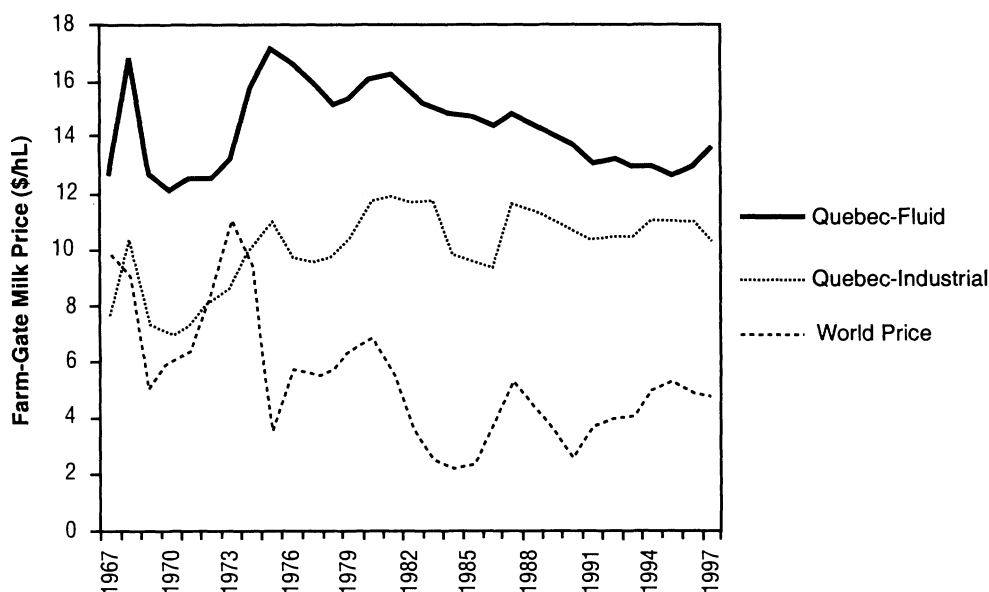
The total fluid (fresh) milk production quota is allocated to the provinces based on current provincial population; thus the share of national fluid milk quota is not subject to bargaining.⁴ The national quantity of industrial milk is set by the Canadian Dairy Commission (CDC) in consultation with the Canadian Milk Supply Management Committee (CMSMC). The CMSMC represents producers, processors, and consumers. Industrial milk quota is divided among provinces based on the production of industrial milk within each province at the time of the creation of the 1973 Milk Supply Management Agreement (Canadian Dairy Commission 1975–76). Under this allocation scheme, the bulk of industrial milk is produced in Quebec and Ontario. The quota is allocated among individual producers by the provincial marketing board. The farm price of milk is set by the CDC to cover “the average” producer’s cost of production after consultations with industry and consumers.

In addition to restricting the total amount of milk produced, the supply management system price discriminates by allocating the amount of milk that may be used to produce fresh milk and processed dairy products. Were it not for this allocation system, farmers would sell milk for use in fluid and industrial milk at the same price (albeit at a higher-than-competitive price due to the quota). Because the demand for fluid milk is less elastic than for milk in processed products, the supply management system restricts the share of milk for fluid use, thereby raising the price for fluid milk and lowering the price for use in processing. The gain to farmers from raising the price for fluid milk more than offsets the loss from lowering the price for processing milk. Even though this reallocation of

milk tends to lower the price of milk for processing, the quota, which raises both the fluid and processing prices, causes the final price for processing milk to exceed the world (competitive) price. Figure 1 shows that the Quebec farm-gate prices (in constant 1969 Canadian dollars) of fluid and industrial milk has exceeded the world price of industrial milk by substantial amounts.

The 1994 GATT altered the distribution of rents between domestic producers and importers. Prior to the Uruguay Round of the 1994 GATT, Canada (under article 11.2.c) used a quota (quantitative border restriction) to block dairy imports. Imports were only allowed into Canada when necessary to maintain a stable domestic consumer price.

FIGURE 1
Price of Milk in Quebec and on the World Market (\$/hL in 1969 CDN\$)



Note: World price is estimated as the domestic target price less the charge on over-quota production. This estimate approximates the price that the Canadian Dairy Commission expected to receive for the production on the world market. Source: GREPA (1998) and CDC (2002).

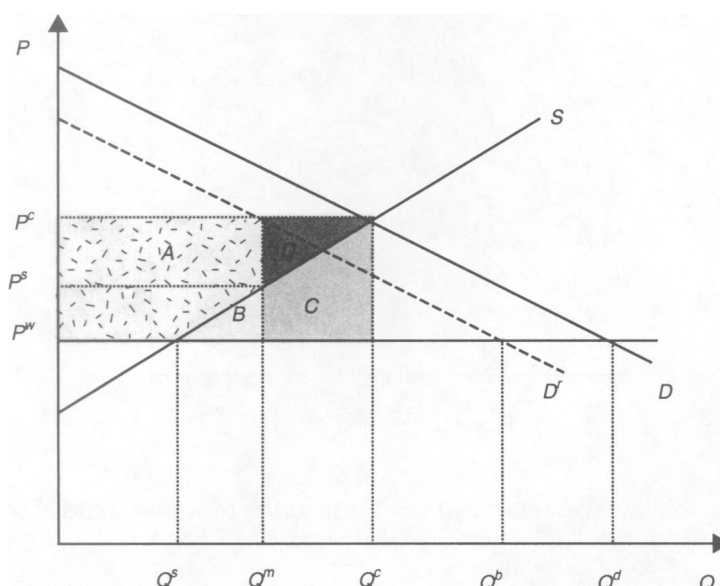
The Canadian dairy market is illustrated in Figure 2. The domestic demand curve is D , the domestic supply curve is S , and the world price is P^w . Under free trade, where the domestic price would equal the world price, Canada would produce quantity Q^s and would import $Q^d - Q^s$.

Prior to the 1994 GATT, the CMSMC chose a quantity-price pair (Q^c, P^c) where few, if any, imports were permitted. By reducing or eliminating imports and increasing the price, the supply management system created rents for domestic producers. In Figure 2, if the CMSMC set quantity and price at (Q^c, P^c) , then farmers' producer surplus would exceed that from free trade by area $A + D$. The federal government, through the Canadian Dairy Commission (which administers the supply management system for the CMSMC) permitted just enough imports to keep the domestic price from rising above P^c . Thus, if the CMSMC made a mistake and set

domestic production too low, say Q^m in Figure 2, so that the domestic price would exceed P^c in the absence of imports, the government would permit imports of $Q^c - Q^m$. Importers would buy the product at the world price P^w and sell it in the domestic market at P^c . Thus, the value of the import quota would be $(P^c - P^w)(Q^c - Q^m)$, area $C + D$ in Figure 2, and farmers' rents from supply management would fall to A .

The 1994 GATT required that all import quotas be replaced by a system of tariff-rate quotas (TRQs). With a TRQ, a small quantity of imports — "in-quota" or minimum access commitment (MAC) imports — enters the country virtually tariff-free.⁵ (In 1995, the MAC was set at 3 percent of 1986–88 domestic consumption, rising to 5 percent by the year 2000.) All subsequent ("over-quota") imports enter at a higher rate. For Canadian dairy, the over-quota tariffs were prohibitive, with tariffs in excess of 250 percent.

FIGURE 2
Supply Management before and after GATT (1994)



Suppose that the MAC quantity of imports equals $Q^d - Q^b$ in Figure 2. Domestic producers face a residual demand curve D' . If the domestic production quota is set at Q^m , Canadian consumers face a price of P^c . Thus, the introduction of the MAC caused a shift of area D from producers to importers (importers receive area $D + C$ but only area D is transferred from producers).⁶

The introduction of a new player (i.e., importers) bargaining for rents from the national supply management system may affect the interplay among the provincial marketing boards. On one hand, a new national player creates a "common enemy" for the boards. On the other, an increase in importer rents will affect various provinces differently. Importers will primarily import processed dairy products, not fresh milk, and therefore the increase in imports will be a larger threat to those provinces with a higher share of industrial milk production.

LOBBYING AND FREE-RIDING

Provincial marketing boards lobby collectively to maintain the current supply management system. By

its very design, this system does not provide incentives for provincial boards to compete with each other for rents. Milk prices are set nationally and the allocation of production quota across provinces is determined by rules based on historical consumption and current population. There is no incentive for an individual board to lobby for a larger share. Thus, as long as the current supply management system exists, the division of profits under supply management is not a function of differential lobbying by provinces.

Provinces that are not satisfied with their rents from the system (or their share of national rents) may opt out of the system. If a province withdraws from the national system, producers in that province would not be allowed to sell their dairy products in other provinces and would have to sell on world markets at world market prices.⁷

Table 1 illustrates that the provinces differ substantially in terms of the scale and efficiency of their dairy production and lobbying expenditures. Ontario and Quebec are the two largest milk-producing provinces. They provide the majority of the milk (66 percent of the fluid milk and 81 percent of the

TABLE 1
Provincial Dairy Industry Characteristics

Province	Quantity Fluid Milk	Quantity Industrial Milk	Administrative Expenditures	Dairy Farmers	Quota Price	Cows per Farm
	(Percentage of National Level, 1973–2000)				(1995–2000)	(2000)
New Brunswick	2.67	1.17	5.46	1.73	9.23	62.3
Quebec	26.13	48.18	36.67	41.94	10.23	43.7
Ontario	40.38	32.93	43.61	29.95	9.11	54.9
Manitoba	4.57	4.03	9.08	7.00	6.93	71.6
Saskatchewan	3.72	2.72	3.02	7.46	5.53	77.7
Alberta	10.07	7.02	3.82	9.31	7.15	107.0
British Columbia	12.46	3.95	6.00	2.61	9.14	112.4

Source: Agriculture and Agri-Food Canada, provincial dairy marketing boards and authors' calculations.

industrial milk), are home to nearly three out of four dairy farmers (72 percent), and provide the vast majority (80 percent) of the total administrative expenditures. Because we assume that the cost per producer to actually manage the program is constant, the data in Table 1 suggest that Ontario and Quebec are paying more than their share of the total lobbying expense.

The price of quota (per hectolitre) is much higher in Quebec and Ontario than it is in the three Prairie provinces. Quebec and Ontario have the lowest number of dairy cows per dairy farmer of all the provinces. Indeed, the size of their average herd is less than half that in British Columbia. (Dairy farms in the United States tend to have even larger herd sizes, which are associated with higher production efficiency.) Thus, firms in these two provinces are likely to be disproportionately harmed by an end to the marketing system because they have the majority of the dairy production, they have more invested in production quotas, and they would likely have to go through more farm consolidation to compete with producers in the United States.

Because one board's lobbying efforts to maintain the supply management system provide an externality to other provinces, we expect that provinces will underinvest in rent-seeking compared to a situation where there was a single agent lobbying the federal government. Second, we expect that other provinces (i.e., New Brunswick and the western provinces), which have less to gain from maintaining the supply management system, will free ride on lobbying by Ontario and Quebec.

MODEL OF RENT-SEEKING AND FREE-RIDING

The provincial boards play a non-cooperative game in lobbying expenditure. The provincial marketing board in province i chooses its level of lobbying expenditure, l_i , to maximize the profits of producers in the province. Let $\pi^s(L)$ be the national rents to farmers from supply management, and let it be a

function of total lobbying expenditure by all the

provinces, $L = \sum_i^n l_i$. Finally, Let σ_i be the province's share of total rents created by supply management (equal to π_i^s / π^s).

The board sets its lobbying expenditure, l_i , to maximize its farmers' expected profits net of its lobbying expenses:

$$\max_{l_i} \sigma_i \pi^s(L) - l_i, \quad (1)$$

$$\text{subject to } L = \sum_i^n l_i.$$

The board's first-order condition or best-response function is

$$\sigma_i \frac{\partial \pi^s}{\partial L} \left(1 + \sum_{j \neq i}^n \frac{\partial l_j}{\partial l_i} \right) = 1, \quad (2)$$

where the board in province i uses its beliefs about the lobbying response of each other province j , $\partial l_j / \partial l_i$, to determine its optimal level of lobbying. According to Equation 2, the board's optimum is achieved by setting the marginal benefit from lobbying (left-hand-side of the equation), which is the marginal increase in rents to province i provided by the system, equal to the marginal cost (the right-hand-side), 1, of an additional unit of lobbying. Assuming that the second order conditions hold, it

can be shown that as long as $\sum_{j \neq i}^n \partial l_j / \partial l_i$ is less than the ratio of the rents of other provinces to the rents of province i ($\sum_{j \neq i}^n \pi_j^s / \pi_i^s$) there will be less lobbying, and less rent created under federalism, than under a situation of a single, national lobby group.

If the board in province j free rides on the expenditure of province i , then $\partial l_j / \partial l_i$ is negative. We hypothesize that provinces with less to gain from supply management — those that produce relatively small quantities of dairy products (“small” provinces) — will free ride on the expenditure of “big” provinces, so that the expenditure of the small provinces, l_s , will be negatively correlated to the expenditure, l_b , of the bigger provinces: $\partial l_s / \partial l_b < 0$.

The equilibrium level of lobbying is determined by solving for the lobbying levels, l_i for each province, using the best-response functions of all the provinces. In our empirical work, we estimate the set of best-response functions. We rewrite province i 's the best-response function, Equation 2, as

$$l_i = R_i(\mathbf{L}_{-i}, \sigma_i, \mathbf{z}), \quad (3)$$

where \mathbf{L}_{-i} is a vector of the lobbying expenditure by all provinces except i , σ_i is the share of supply management rents going to province i and \mathbf{z} is a vector of exogenous variables that affect $\partial \pi^s / \partial L$ by altering the political climate.

Lobby expenditure is a function of the share of rents going to the province, σ_i . We do not observe the provincial share of rents directly, so we use the ratio of provincial quota value to national quota value as a proxy. Because the price of production quota may be affected by the probability of retaining supply management, which is, in turn, a function of lobby expenditure, we used various instruments for the quota value.⁸ Since industrial and fluid milk face different threats from a reduction in import protection (because it is easier to trade milk products as opposed to fresh milk), we also include the provincial share of total industrial milk as a separate variable.

We included variables to capture the provincial industry's influence (included in the vector \mathbf{z}). The more dependent the provincial agricultural sector was on dairy, the more influence the industry was

assumed to have. Likewise, as the percentage of dairy farmers in the population increased, the greater the industry influence. Two political variables, the number of government members of Parliament (MP) and whether the province and the federal government had the same party in power, were used to capture the influence of the provincial marketing board over the federal government.

Other factors that affect the perceived probability of keeping supply management (vector \mathbf{z}) would be the potential for institutional change, such as brought about by trade agreements. Therefore, we include two dummy variables for the two years prior to the 1994 GATT, assuming that producers would perceive the trade negotiations as threatening supply.

A log-linear specification was estimated for Equation 3:

$$\ln l_i = \alpha + \delta' \ln \mathbf{L}_{-i} + \beta \ln \sigma_i + \gamma' \ln \mathbf{z} + \xi_i \quad (4)$$

All the best-response function equations were stacked when we estimate them.

The estimates of Equation 4 are used to test our four key hypotheses about rent-seeking and free-riding. To test our first hypothesis we examine the reaction between the expenditure of the various provinces to each other to determine whether provinces underinvest when it comes to rent-seeking. If

they cooperate (i.e., act as single unit) $\sum_{j \neq i} \delta_j > 0$,⁹

If the provinces do not take into account the positive externalities created by their lobbying,

$\sum_{j \neq i} \delta_j = 0$, which, since there are three provincial

groups, implies $\delta_j = \delta_k$. For the second hypothesis we examine whether province i free rides on the lobbying expenditure of province j , so that the coefficient on the expenditure l_j is negative: $\delta_j < 0$.

Third, we test whether provinces increased lobbying efforts just prior to the ratification of the 1994

GATT agreements (using dummy variables included in z_i). Because the 1994 GATT was expected to have a major impact on the dairy industry (affecting quotas and tariffs), we would expect an increase in expenditure in 1993 and 1994 prior to its ratification. Fourth, we test whether expenditure permanently changed as a result of the 1994 GATT. One might expect that provincial lobbying would increase after the 1994 GATT went into effect, if importers started to lobby.

DATA

Our analysis is based on a cross-sectional, time series dataset. The cross-section covers seven provinces — New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia — that produce the majority of the milk in Canada and have had quota exchanges in place for a number of years. (Data were not consistently available for the three remaining provinces.) The series run from the introduction of supply management in 1974 through 2000.

The price of production quotas and the amount of administrative and promotional expenditure come from the annual reports of the provincial marketing boards. Administrative expenditures are revenues collected from the participating producers at the provincial level. Agriculture and Agri-Food Canada (2001) provided the quantity produced by each province, the average number of cows per producer, the percentage of the agricultural revenue supplied by the dairy industry, and the number of dairy producers as a percent of the provincial population (which reflect the importance of the dairy industry to the province).

World price is contained in the Canadian Dairy Commission (2001). Data on US costs and consumption came from the USDA-ERS (2001).

RESULTS

We estimate Equation 4 by regressing a province's administrative expenditure on the ratio of provin-

cial quota value to national quota value, the administrative expenditures of other provinces, provincial fixed effects, dummies that capture international agreements, and other variables. Since the quota value is the expected net present value of future profits stemming from supply management, it presumably varies with the probability of the existence of supply management, which in turn is a function of rent-seeking expenditure. Thus, the quota value is endogenous as are the expenditures of other provinces. Consequently, we use instrumental variables to estimate this equation.¹⁰ We also adjust for third-order autocorrelation and heteroskedasticity (using the Newey-West 1987 method).

Our estimates are reported in Table 2. We cannot reject our first hypothesis that the sum of the slope of the reaction function to the expenditure of other

provinces is less than $\sum_{j \neq i} \pi_j / \pi_i$. For Quebec,

Ontario, and the small provinces, the sum of the other slopes was significantly less than the ratio of the rents from supply management (F-stats of 45.41, 40.11 and 21.26 respectively). That is, the provincial marketing boards clearly are not cooperating when lobbying the federal government.

The provinces are spending less than they would if they each just maximized their own expenditure without regard to the other provinces. For provinces to spend the same as they would under no free-riding, the sum of the slopes of the reaction functions of the two provincial groups to the third must be zero. The slopes of Ontario and the small provinces' expenditure to Quebec is significantly less than 0 (F-stat 8.36, p-level 0.00). Likewise, the slopes of Quebec and the small provinces reaction function to Ontario is significantly less than zero (F-stat 6.21, p-level 0.02). Only the reaction functions of Quebec and Ontario to the small provinces was not significantly different than zero (F-stat 0.277, p-level 0.60).

Specifically, our model supports our second hypothesis that the small dairy producing provinces

TABLE 2
Instrumental Variables Regression on Provincial Administrative Expenditures

<i>Variable</i>	<i>Coefficient</i>	<i>ASE</i>
ln(provincial quota value/national quota value)	0.209*	0.096
ln(provincial share of industrial milk)	-0.354	0.253
Lobbying expenditure elsewhere		
Small provinces to Quebec	-0.379*	0.104
Small provinces to Ontario	-0.433*	0.164
Quebec to small provinces' expenditures	0.248	0.185
Ontario to small provinces' expenditures	-0.408	0.216
Quebec to Ontario expenditures	-0.985*	0.474
Ontario to Quebec	-0.251	0.127
Regime		
PreGATT (1993, 1994)	0.280*	0.107
GATT (1995 to 2000)	0.434*	0.164
Political influence		
Members of Parliament in the governing party	-0.004*	0.002
Same party provincially and federally	-0.171*	0.029
Industry structure		
ln(provincial dairy share of agricultural income)	1.289*	0.459
ln(producers as portion of population)	-0.037	0.146
Constant	25.882*	3.054
AR(1)	0.192*	0.063
AR(2)	0.126*	0.057
AR(3)	-0.405*	0.081
R ²	0.996	

Note: We do not report the province dummies. Manitoba and Saskatchewan were significantly higher than Ontario and British Columbia (2.585 with a p-stat of 0.01, and -3.082 with a p-stat of 0.04).

*We can reject the hypothesis that the coefficient is not statistically significantly different from zero at the 0.05 level.

(New Brunswick, Manitoba, Saskatchewan, Alberta, and British Columbia) free ride on the larger ones (Quebec and Ontario). The smaller provinces decreased their expenditures by 0.4 percent for each percentage point increase in expenditures by Quebec or Ontario.¹¹ This coefficient is statistically significantly different from zero at the 0.05 percent level. Quebec also seemed to free ride on the ex-

penditure of Ontario. When Ontario increased its expenditure by 1 percent, Quebec decreased its expenditure by 1 percent. We find no statistically significant evidence of reactions by Quebec or Ontario to the smaller provinces, or by Ontario to Quebec.¹²

The magnitude of the free-riding is large. We simulate the outcome if all provinces ignored each

other's expenditure when choosing their own level of lobbying in 2000. Free-riding made a large difference in over-all funding levels (see Table 3). The small provinces would have spent \$2.73 million more in lobbying (an increase of 47 percent) if they did not free ride on the expenditures of Quebec and Ontario. More surprising, perhaps, is that Quebec would have spent a further \$7.7 million (or an increase of 68 percent) if it did not free ride on the expenditure of Ontario.

TABLE 3
Increase in Expenditure for 2000 Without Free-Riding

	<i>Small</i>	<i>Quebec</i>	<i>Total</i>
Expenditure (\$million)	2.73	7.75	10.48
Percent	47	68	39

Note: Ontario already has a conjecture of zero in relation to the other provinces.

The model also provides support for our third and fourth hypotheses. The uncertainty about the future of supply management prior to the 1994 GATT led to unusually heavy lobbying campaigns. In the two years before ratification, lobbying expenditures increased a statistically significant 0.3 percent. Since 1995 (when 1994 GATT went into effect), provincial expenditures rose a statistically significant 0.4 percent. This increase may be due to the increased threat to supply management from imports.

Administrative expenditures apparently substitute for direct political influence. The effects are statistically significantly different from zero, but small. Expenditures decreased with the number of government MPs a province sent to Ottawa, and decreased if the province had the same party in government provincially as was in power federally. In Canadian politics, the ability to create federal-provincial coa-

litions has resulted in more favourable agricultural policy (Schmitz, Furtan and Baylis 2002). Therefore, provincial marketing boards may substitute away from direct lobbying, and instead count on the party politics to carry their message to the federal government.

As expected by the model, expenditure rises as the share of rents flowing to the province increases. There is also some evidence that the more important the industry is to the province, the more the provincial marketing board spends on lobbying. This last result is consistent with Estey and Caves' hypothesis that the industry structure matters.

EFFECT OF TRADE AGREEMENTS ON PROVINCIAL INTERACTION

A number of tests were conducted to determine the robustness of the results to changes in the model specification. Since 1995, the 1994 GATT, through the MAC, required Canada to import some dairy products virtually tariff-free. The vast majority (over 95 percent in 1999) of the imports are in the form of processed dairy products (primarily butter and cheese). Given that a disproportionate amount of the processing industry is located in Ontario and Quebec, one might hypothesize that Quebec and Ontario had more to lose with the introduction of the 1994 GATT. Because the 1994 GATT may have changed the relative bargaining power of the provinces, we tested whether the provincial reaction functions were the same before and after the 1994 GATT (Table 4). Both the reaction of the small provinces to Ontario and Quebec and the reaction of Ontario and Quebec to the small provinces became more negative after the 1994 GATT. The reaction function of Quebec to Ontario was significantly less than zero before the 1994 GATT, and was not significantly different from zero after the 1994 GATT (although the change was not significant at the 0.05 level, *p*-value 0.40). This may indicate that Quebec's free-riding occurred primarily before the 1994 GATT, not after. Because of its concentration of industrial milk production,

TABLE 4
Reaction Functions before and after the 1994 GATT

Reaction Function	Pre-GATT		Post-GATT	
	Coefficient	ASE	Coefficient	ASE
Small provinces to Quebec	0.720*	0.286	-0.620*	0.258
Small provinces to Ontario	1.600	1.337	-0.467	2.375
Quebec to small provinces' expenditures	-0.201	0.433	-6.454	5.091
Ontario to small provinces' expenditures	-0.508	0.411	-2.605	2.285
Quebec to Ontario expenditures	-3.904*	1.656	-1.212	3.245
Ontario to Quebec expenditure	0.529	0.623	-0.842	1.323

Note: All other coefficients were held constant before and after the 1994 GATT and were not significantly different from those presented in Table 2.

Quebec has the most to lose from a reduction in trade barriers. This fact may be reflected in a change in behaviour when it comes to lobbying. The reaction of the small provinces to Quebec and Ontario changed significantly before and after the 1994 GATT ($p\text{-level} = 0.00$). Thus, the free-riding by the small provinces on the large provinces occurred after the 1994 GATT, not before. One possible explanation for this shift is that the smaller provinces would be less affected by the loss in supply management and therefore the increased threat from the 1994 GATT was not as much a concern.

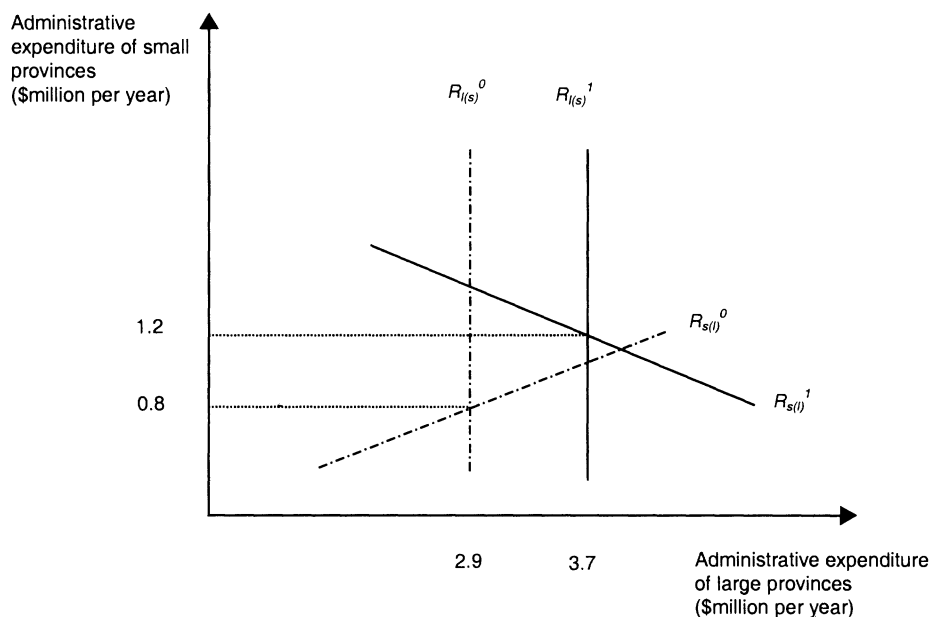
The reaction functions of the large and small provinces before and after the 1994 GATT are given in Figure 3. The reaction function of the small provinces to the large provinces before the 1994 GATT is $R_{s(l)}^0$, and after the 1994 GATT is $R_{s(l)}^1$. Likewise, the reaction functions of the large provinces to the small are labelled as $R_{l(s)}^0$ and $R_{l(s)}^1$ for before and after the 1994 GATT respectively. The average expenditure per year (in 1969 dollars) is given on the axes. Note that the average expenditure of both groups went up after the 1994 GATT, although the expenditure of the large provinces increased twice as much as that of the small provinces.

A change in the 1994 GATT that allows greater imports is akin to an institutional change. Within Canada's federalist structure, it is primarily groups at the provincial level that lobby for national agricultural policy. At the same time, the provincial distribution of rents from the supply management policy are fixed, and do not change with lobby expenditure. Those parties that stand to lose the most from the change in the institutional structure, which in the dairy case are Ontario and Quebec, will lobby the most to block the change. Thus, the federalist structure is in part responsible for the free-riding of the small provinces on Quebec and Ontario.

ROBUSTNESS TESTS

Our original specification considers reactions between Ontario, Quebec, and the smaller provinces. We tested for the validity of aggregating the smaller provinces. When the smaller provinces were each treated separately, the coefficients on their reaction functions to Quebec and Ontario were not statistically different (χ^2 value of 2.86, giving a $p\text{-value}$ of 0.41). When the reaction of the small provinces to Ontario was looked at separately from the reaction

FIGURE 3
Reaction Functions before and after the 1994 GATT



Note: before the GATT, the slope of the small provinces' reaction function was not statistically different than zero, although here it is represented as being positive based on the coefficient presented in Table 3 (slope = 0.4). After the GATT, the slope of the reaction function is equal to -0.3. For simplicity, the reaction functions of the large provinces to the small provinces before and after the GATT are represented here as having slopes equal to zero.

to Quebec, the hypothesis that the coefficients were the same could not be rejected (χ^2 of 0.026 and p-stat of 0.88).

Although we had no expectation that the lobbying should increase over time, we tested for time trends. We considered linear, quadratic, and cubic terms. None were individually or collectively statistically significantly different from zero.

We also considered the possibility that some of the promotional expenditures of provincial boards was designed to lobby the federal government, rather than advertising for consumers. We estimated the analogous equation to Equation 4 where we replaced

administrative expenditure with promotional expenditure. The only variable that was statistically different than zero at the 0.05 level was the reaction of Ontario promotional expenditure to Quebec. When Quebec increased its expenditure by 1 percent, Ontario increased its promotion by 1.4 percent. This may imply cooperation in promotional campaigns. However, the reverse was not true. Promotional expenditure was also added as (endogenous) right-hand side variables in the regression of administrative expenditure, and was not significant at the 0.05 level (p-level of 0.44).

Variables were attempted to proxy for the influence of importers but these were not significantly

different from zero and did not change the coefficients on other variables (p-level of 0.99). As well, there was some thought that dairy cows would capture some of the rent from supply management. When dairy cow prices were added as a right-hand side variable (instrumented), their coefficient was not significantly different from zero at the 0.05 level (p-level of 34).

We also checked to see if the political influence varied by province. They were not statistically different from each other (p-level 0.51). When testing the effects of the 1994 GATT on the reaction functions, the effect of the 1994 GATT on other variables was also tested. No other coefficient changed significantly before and after the 1994 GATT.

CONCLUSIONS

Canadian federalism adds a specific twist to rent-seeking. Provinces and provincial groups participate in rent-seeking for certain national policies (such as trade policy), yet these policies are not excludable. Because the division of powers in the case of agriculture places the industry under joint provincial and federal jurisdiction, one creates the situation where the industry is organized at a provincial level, and collectively lobbies for certain national policies. This situation is rife with the potential for collective action problems.

This paper adds to the literature which explores what effect institutions (specifically the constitutional division of powers and trade agreements) have on the policy process. All rent-seeking takes place within an institutional structure (set of rules). Different rules can affect the amount of resources invested in rent-seeking activities, and their effectiveness (Grossman and Helpman 1996). If the industry group collectively lobbies for the rents, some members of the group may choose to free ride. In the example used in this paper, the Canadian dairy industry, we show this result to be the case. Provinces that have less to lose from a change to the

supply management system free ride on the expenditure of the larger provinces.

Provincial dairy boards spend a substantial amount of money (\$28 million in 1999) on administrative expenditure, much of which is used to lobby the federal government to maintain a marketing system that provides dairy producers with substantial rents. However, we find that provinces free ride when lobbying the federal government for supply management rents, decreasing total lobby expenditures by over \$10 million in 2000 from where they ignore each other. Certainly, this is far below the level of expenditure, and presumably the level of associated rents, that would occur if all lobbying funds were collected by one national organization.

Trade agreement negotiations threaten domestic producers that benefit from protectionist policies. Some provinces benefited more from these policies, and the rent-seeking bargain was shaken, resulting in a shift in free-riding. During 1993 and 1994, when the Canadian government faced decisions regarding the Uruguay Round of the 1994 GATT, provincial lobbying expenditure increased. The 1994 GATT required that Canada alter the import quotas supporting the higher domestic price for milk to tariffs, and that these tariffs were to be decreased over time. The institutional change caused by this trade agreement may have increased uncertainty about the future of supply management and it opened the door to other importers to bid for the rents from supply management. Since the implementation of this agreement, provincial marketing boards permanently increased the level of their lobbying expenditure.

Because of the institution of federalism, when provincial groups collectively lobby the federal government for a non-excludable policy, they may not spend as much or be as effective as a national organization would have been. This result should be taken into consideration when organizations are weighing the benefits of being organized at the local level (to remain "grassroots") versus having a single national authority with the right to levy a single fee.

Trade agreements also bring about institutional change and can alter the distributional effect of other national policies, thereby changing the nature of the rent-seeking bargain. When considering the effect of trade agreements on federal countries like Canada, how these same trade agreements have altered the relationship among provinces should be included.

NOTES

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¹The subsequent North American Free Trade Agreement (NAFTA) did not change the CUSTA agreement on agricultural trade between Canada and the United States, thus it was not expected to have a direct effect on the dairy industry.

²Throughout this paper, GATT should be taken to mean the 1994 GATT.

³For example, a former representative of the Canadian Association of Consumers (CAC) stated in an interview that the CAC actively lobbies and supports research on supply management issues. Regrettably, data were not available for either consumer or processor lobby expenditure.

⁴A farm cannot sell milk without a production quota. A dairy farm's production quota is a licence that gives the owner of a production quota the right to produce the specified quantity. These quotas are tradable between producers within a province.

⁵For example, the tariff on in-quota cheese imports is 3.5 cents per kilogram, which is less than one-half of 1 percent of most retail cheese prices.

⁶The federal government offers the import quotas (for a nominal lump-sum fee) to firms in proportion to their previous imports. Historically, these importers were firms such as Safeway rather than producers or processors.

⁷No province has withdrawn from the dairy system. However, in chickens and other industries with supply

management, provinces have opted out of the national system.

⁸These instruments included the US cost of production, US consumption, world price, lagged production, production technology variables (e.g., number of cows per producer and output per cow), provincial input prices (feed price index and farmland price) and provincial price of beef cows, a co-product of dairy production.

⁹Specifically, as noted above, for each i , $\Sigma \delta_j = \Sigma \pi_j / \pi_i$, which is greater than zero.

¹⁰The instruments used include all the exogenous right-hand side variables, a dummy for the *Western Grain Transportation Act* ($=1$ after 1983), \ln (US variable costs of production), \ln (US economic costs of production), \ln (provincial price of agricultural land), \ln (provincial beef cow price), \ln (average provincial milk produced per cow), \ln (average provincial cows per producer), lagged output per province, lagged butter imports, lagged quota value, lagged milk price, \ln (US total consumption of dairy products), \ln (US consumption of milk), and the real rate of interest.

¹¹We cannot reject the hypothesis that the coefficients which capture the smaller provinces' reactions to expenditures in Quebec and in Ontario are identical ($\chi^2 = 0.07$, $p\text{-stat} = 0.78$). The small provinces reduce their expenditure by 0.7 percent for a percent increase in the sum of expenditure of Quebec and Ontario.

¹²In this case being big is actually a disadvantage, in that the quantities the provinces set are lobby expenditures, that is, a cost. In a normal Stackelberg model, the quantity that firms set is something that gives them (and only them) higher profits. In other words, the externalities in an oligopoly market are negative — the more one firm produces, the lower the other firm's profit. In this case, the externalities are positive, the more lobbying one firm does, the higher the other firm's profit. Therefore, being big is negative in this case, whereas in the normal Stackelberg case, it is positive.

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