



THE PRIVATIZATION OF POTASH CORPORATION OF SASKATCHEWAN

BY MARK A. MOORE and

AIDAN R. VINING

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MARK A. MOORE

Beedie School of Business, Simon Fraser University

Mark Moore is a Senior Lecturer at the Beedie School of Business, Simon Fraser University. His research interests include cost-benefit analysis, social discounting, privatization, and public policy analysis.

AIDAN R. VINING

Beedie School of Business, Simon Fraser University

Aidan Vining is the CNABS Professor of Business and Government Relations at the Beedie School of Business, Simon Fraser University. His research interests include cost-benefit analysis, privatization, policy analysis, and public-private partnerships.



203-2727 Portage Avenue, Winnipeg, Manitoba Canada R3J 0R2

Tel: 204-957-1567

Email: manitoba@fcpp.org

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TABLE OF CONTENTS

Executive Summary.....	4
Introduction.....	6
Three Overriding Principles of Resource Management.....	7
Theory and Evidence on the Effect of Ownership on Productive Efficiency.....	9
Potash Corporation "Before and After" Privatization Performance.....	11
Privatization and the Extraction of Scarcity Rents.....	14
Privatization and the Exercise of Monopoly Power.....	19
Conclusion.....	21
Bibliography.....	23
Endnotes.....	26

EXECUTIVE SUMMARY

The Alan Blakeney NDP government of Saskatchewan established the Potash Corporation of Saskatchewan (PCS) in 1975. PCS continued to operate as a Crown Corporation until the Grant Devine Conservative government, elected in 1982, sold a majority of the shares in 1989 and 1991. In April 1994, the final government-owned shares were sold to private investors. The privatization of PCS was the largest provincial privatization in Canadian history and it played a central role in the Devine government's agenda. This study examines the aggregate economic impact that the privatization of PCS has had, and will have in the future, on the welfare of the citizens of Saskatchewan.

Potash mining is a global industry, and potash is found in commercial quantities in only a relatively few places in the world, Saskatchewan chief among them. This study identifies three principles of resource management: (1) the people of Saskatchewan own the underlying potash resource; (2) as owners, the people of Saskatchewan should seek to maximize the income that they and future generations receive from the resource; (3) the government of Saskatchewan should extract any economic value it decides to collect from this resource as efficiently as possible.

The study reviews the effects of private versus public ownership on the achievement of productive efficiency and documents the considerable post-privatization performance improvement. The Devine government deserves credit for this. There were extraordinary gains to PCS shareholders after privatization. However, it is less clear how much of these improvements accrued to residents of Saskatchewan. Assessing their share depends on a determination of the residency of the shareholders of the privatized PCS and of the incremental taxes collected by the Saskatchewan government, which accrue to all provincial residents. Regarding share ownership, unfortunately the evidence is incomplete, but ownership did change considerably over time. We do know that by 2010 just less than 50% of shares were owned by Canadians; how many of these were Saskatchewan residents is unknown. Given the sub-optimal potash tax and royalty regimes of all post-privatization Saskatchewan governments, it is clear that few of the performance gains resulted in significant incremental provincial revenues.

Finally, we analyze the extent of Saskatchewan's and PCS's market power in world potash markets, and consider how privatization might have increased PCS's ability to earn extraordinary profits from such power. Given the evidence of performance improvement, it seems likely that the potential for increased market power did occur. However, given the inefficiency of the tax and royalty regimes and the low proportion of shares held by Saskatchewan residents throughout the post-privatization period, it is unlikely that the people of Saskatchewan benefited significantly.

LIST OF ACRONYMS

CBA	Cost-Benefit Analysis	ROA	Return on Assets
NPV	Net Present Value	ROS	Return on Sales
PCS	Potash Corporation of Saskatchewan	SOE	State-Owned Enterprise

INTRODUCTION

The Alan Blakeney NDP government of Saskatchewan established the Potash Corporation of Saskatchewan (PCS) as a Crown Corporation by an Order-in-Council in 1975. It began operations in 1976-7 with the purchase of four potash mines and additional reserves. By the late 1970s, these mines made up approximately 40% of Saskatchewan potash productive capacity. PCS continued to operate as a Crown Corporation until 1989 when it became a corporation under the *Business Corporation Act*. The Grant Devine Conservative government, elected in 1982, sold a majority of the shares in two public offerings in 1989 and 1991, for approximately \$1.237 billion.¹ Since then, PCS Inc. has operated as a publicly traded firm on both the TSX and the NYSE. The Roy Romanow NDP government further reduced the government's ownership share in December 1993. In April 1994, the final government-owned shares were sold to private investors. At that time, the limitations on foreign share ownership and on the extent of share ownership concentration, and the requirement that the head office be located in Saskatchewan were all removed.² By 2010, PCS had become a diversified multinational fertilizer company, with most of its top executives located in Chicago. Canadian residents owned approximately 49% of the outstanding shares. However, to secure government support against a proposed BHP Billiton takeover, PCS management committed to maintain the PCS head office in Saskatoon in 2010.³ As of the last several years, PCS currently produces about 20% of the world's potash.⁴ A 2016 proposed merger with Agrium would

reduce the number of potash firms currently operating in Saskatchewan, with the merged PCS-Agrium entity owning 23% of global potash capacity and more than 60% of North American capacity.⁵

The privatization of PCS was the largest provincial privatization in Canadian history.⁶ The PCS privatization played a central role in the Devine government's agenda.⁷ The Devine government privatization policies changed the political culture in Saskatchewan, and probably in Canada more generally. The extent of this change is illustrated by the fact that subsequent NDP governments did not reverse Devine's privatization policy. Furthermore, the Devine privatization program may well have also influenced or reinforced federal policy.⁸

The focus of this paper is on the aggregate economic impact that the privatization of PCS has had, and will have in the future on the welfare of the citizens of Saskatchewan. A number of economists and social scientists have studied both the nationalization and privatization of potash in Saskatchewan over the last three decades.⁹ Much of this commentary and analysis has displayed a strongly ideological tone. This was probably inevitable given the importance of nationalization and privatization to political debate and electoral conflict in Canada over most of the 20th Century. Potash mining, however, is a global industry and a significant number of economists and policy analysts have studied the genesis and evolution of the potash and related natural resource industries from both theoretical and empirical perspectives. Ideology and distributive politics have also played an important role in these analyses because potash is a non-renewable

natural resource that is found in commercial quantities in only a relatively few places in the world.¹⁰

We proceed as follows. The next section identifies three principles of resource management, and the following section provides a review of the literature that assesses the effects of private versus public ownership on the achievement of productive efficiency.

We then specifically compare the performance of PCS over a limited period (because of data limitations) as a state-owned enterprise (SOE) to its performance over some (quite a bit longer) period following privatization;

in other words, we make the “before-and-after” privatization performance comparison. Next, we consider the potential impact of public versus private ownership on the ability of the residents and the provincial government to capture any scarcity resource rents.¹¹ Finally, we analyse the extent of Saskatchewan’s and PCS’s market power in world potash markets, and consider how public or private ownership might alter the ability to exploit any such market power.¹² Finally, we conclude with a brief discussion of the implications for the ownership of non-renewable natural resource firms.

THREE OVERRIDING PRINCIPLES OF RESOURCE MANAGEMENT

In order to at least contextualize the role of political ideology, the paper lays out three normative principles that provide a framework for the analysis that follows. Readers who do not subscribe to these principles (conceptually straightforward though they are) are unlikely to agree with the overall analysis or its conclusions. These three principles are: (1) the people of Saskatchewan own the underlying potash resource; the foundation of this ownership is primarily (although not exclusively) a function of Canadian constitutional law. (2) As owners of the resource, the people of Saskatchewan should seek to maximize the net present value (NPV) of the income that they and future generations receive from the resource (that is, the analysis adopts an intergenerational perspective). (3) The government of Saskatchewan should extract any rent share it decides to collect as efficiently as possible, especially recognizing the fact that resources "in the ground" have value to both future generations and future governments.

The Canadian constitution explicitly recognizes provincial primacy over natural resources.¹³ The first principle implicitly raises the issue of which costs or benefits count, or "standing". In a cost-benefit analysis (CBA) this is important because it requires specifying clearly who has standing and, as a consequence, is entitled to some share of the rents. Should only residents of Saskatchewan have standing or should standing be extended to all residents of Canada? Should standing be extended even further to include shareholders of potash extraction firms that reside elsewhere in the world, including the United States? It is worth mentioning what these principles do not include, as much as what is included. The focus of principle 1 from a standing perspective is on the welfare of Saskatchewan residents, rather than on the share, or absolute amount, that accrues to the (provincial) government of Saskatchewan.

The second principle recognizes that the welfare effects of privatization in a CBA can be decomposed into the effects on consumer surplus, producer surplus

and government surplus.¹⁴ As regards potash, 95% of Saskatchewan potash output is exported and most domestic consumption occurs outside of the province.¹⁵ Consequently, we can and will ignore any welfare effects on Saskatchewan consumers. Under private ownership, by 1995, non-Saskatchewan residents owned a large percentage of the outstanding shares.¹⁶ Warnock claims that U.S. residents owned approximately 80% of PCS shares. While PCS was 100% Saskatchewan-owned in 1988 as a Crown Corporation, by 2010 provincial residents owned only a "small fraction" of the privatized firm.¹⁷ Given this, our primary focus here is on Saskatchewan government tax revenues (government surplus) rather than on all above average profits or rents that accrue to potash firms and their owners (producer surplus). The second principle also explicitly introduces a temporal or intergenerational dimension to any discussion of the meaning of resource rent maximization and its capture. Taking the second principle seriously inevitably complicates any policy analysis because it introduces the issues of both dynamic efficiency and intergenerational equity.¹⁸

The third principle, relating to efficient taxation by government, raises issues that can be framed in a number of ways. The most pertinent framing for our purposes is around political economy issues, specifically concerning government failure. It may seem obvious that government would claim its share of resource rents as efficiently as possible. However, this is far from the truth in many cases. For example, a current government may be tempted to provide a legislative and administrative framework in a way that increases its share of rent, but does not maximize the value of the resource over time (the NPV). In addition, even governments that are motivated to implement efficient tax regimes face the problem that they cannot bind their successors to an efficient regime. This is particularly important in the context of non-renewable natural resources that explicitly introduce issues of dynamic efficiency.

If one accepts the three principles, there are three key questions relevant to evaluating the likely economic effects of the PCS privatization relative to those that would have occurred under its continuation as a SOE. These questions are: (1) To what extent should one

expect a transfer from public to private ownership (or *vice versa*) to affect the technical or productive efficiency of the organizational entity that is actually extracting the resource? While the aggregate benefits of the exploitation of the potash resource may over time contribute a more or less equitable distribution of wealth, it is useful (at least initially) to look at efficiency changes, or more technically, at the productive efficiency changes. (2) Given the assumed principle that potash is a non-renewable resource owned by the people of Saskatchewan, how would we expect the form of ownership of PCS to affect the ability of the government, acting on behalf of its citizens, to efficiently extract its share of the scarcity rents? (This issue does not arise in the context of privatization or nationalization of other assets that do not involve resource rents, such as automobile manufacturing.) Scarcity rents are those earned when and if PCS or some other producer can sell potash for revenues that exceed all of its economic costs (including a normal rate of profit), simply because of its ability to access higher quality and lower cost potash reserves than those of

the highest (marginal) cost producer. In particular, the presence of scarcity rents raises the issue of how these rents, and the share accruing to government, vary under private relative to public ownership or compared to the government revenue that would accrue through the use of other potential policy instruments, such as taxes and royalties, or competitive bidding. (3) How does the nature of ownership affect the ability of Saskatchewan to share in any potential monopoly rents (abnormally high returns to investment) that can be extracted through the exercise of the province's market power in world potash markets? Canpotex is a global export cartel or marketing board that may be (or may have been) able to exercise some market power; that is, an ability to influence global potash prices.¹⁹ PCS has participated in Canpotex both as a SOE and under private ownership. Given that PCS, and more generally Saskatchewan, contains a significant percentage of the known global reserves of potash, Canpotex and even PCS alone may also have, or have had, sufficient market power on their own to earn monopoly rents.

THEORY AND EVIDENCE ON THE EFFECT OF OWNERSHIP ON PRODUCTIVE EFFICIENCY

With privatization, members of a society unambiguously gain to the extent that (1) private ownership results in greater productive efficiency that raises the productivity of the firm's inputs (and hence lowers their costs) relative to what they would be if the firm continued as a SOE, and (2) the greater efficiency raises profits and the owners of the firm have standing (e.g., they are nationals, or in this case, residents of the province, as opposed to other Canadians or foreigners without standing). In other words, productivity improvements are always socially valuable provided those benefiting from the improvements count from a social accounting or cost-benefit analysis perspective. Here, we examine the relevant evidence, primarily on the first point.

Property rights theory,²⁰ agency theory²¹ and related approaches all posit that private sector ownership of corporate entities is likely to result in greater productive efficiency than public sector ownership in competitive or somewhat competitive industries (that is, where there are not significant market failures, such as natural monopolies).

The specific causal mechanisms that should lead to performance improvement following privatization include: (1) clearer corporate and managerial goals, most importantly an unambiguous focus on profit maximization;²² (2) "harder" budget constraints than those imposed prior to privatization;²³ (3) more intense monitoring by shareholders after privatization than that exercised by politicians or civil servants prior to privatization;²⁴ (4) more efficient markets for ownership control and for managers and workers;²⁵ (5) elimination of political strategies; for example, less emphasis on the domestic market or on risky international markets that provide political spillover benefits;²⁶ (6) elimination of (cost-raising) employment *per se*;²⁷ (7) higher-powered incentives for employees to be more efficient;²⁸ and (8) more competitive and liberalized product markets, including reduced forms of protectionism.²⁹ Bloom *et al.* studied management practices broadly relating to these

various causal mechanisms in more than ten thousand organizations across twenty countries: one of their major conclusions is that "publicly (i.e., government) owned organizations have worse management practices across all sectors we studied. They are particularly weak at incentives; promotion is more likely to be based on tenure (rather than performance), and persistent low performers are much less likely to be retrained or moved."³⁰

Global evidence, generally based on a wide range of measures of firm performance that compares performance before and after privatization, shows that managerial efficiency usually improves in competitive or somewhat competitive industries in the years immediately following privatization.³¹ Nellis summarizes this evidence as follows: "In the main, studies confirm that privatized industries evidence increased efficiency (usually labour efficiency, but often increased total factor productivity as well), increased output, and higher returns to capital."³² With some caveats, surveys of the empirical evidence generally find improved performance following privatization in a variety of institutional settings.³³ Most of the subsequent empirical literature, including that which addresses the evidence from developing countries³⁴ or less competitive industry settings,³⁵ continues to find performance improvement.

A weakness of this "before-after" privatization evidence, though, is the lack of an observable and plausible counterfactual. Without it, it is more difficult to assess what would have happened over time in the absence of the privatization. Furthermore, in order to convincingly assess the impacts of privatization, one would like to control for the effects of changes in regulatory conditions, general economic conditions (e.g., the business cycle) or other factors that may confound an understanding of the effect of privatization.³⁶ It is impossible to control for these factors comprehensively without a very large number of observations of both privatizations and non-privatizations. But one way of trying to control for these factors to some degree is to compare the performance of firms in the same environment that differ only or mainly with respect to ownership. In order to estimate the impacts of privatization on previously SOEs, a straightforward comparison is with similar firms that have been, and remain, under state ownership.

Another plausible comparator group consists of similar firms that have always been, and remain, privately owned; for example, Boardman et al. compared the performance of Canadian National Rail before and after privatization with Canadian Pacific Rail.³⁷ With regards to productivity, the relevance of the first comparison group is clear: does privatization of SOEs result in better or worse productivity? The second comparison is also valuable, though, because it sheds light on whether privatized firms catch up to similar private sector firms in terms of their productivity.⁴⁸

In the case of PCS, unfortunately, Boardman, Vining and Weimer³⁸ could find no comparable SOE comparator. Unfortunately, again, due to consolidation of the Saskatchewan industry, there is also no plausible “always-private” comparator either. If PCS had remained focused on potash production and marketing and a privately-owned Saskatchewan producer had maintained a similar potash-specific focus, there would be such a comparator. However, after various acquisitions, currently there are only three major, separately-owned Saskatchewan producers: PCS, Mosaic and Agrium (holding constant the proposed PCS-Agrium merger), and all three have evolved, at different points in time, into diversified producers and marketers of various fertilizers, including potash, phosphates and nitrogen.^{39/40} Therefore, as regards ownership effects, this leaves a basic before-after comparison as the only viable comparison option. In spite of the aforementioned caveats, it is an important and informative comparison.

Many studies have examined performance change around privatization over an approximately six-year window: 3 years prior to privatization and 3 years following privatization. We are aware of only four relevant studies that examine post-privatization performance effects over longer time frames. Villalonga examined the effects of privatization for 24 Spanish firms for the years 1985–1996 and found that both return on assets (net income divided by assets or ROA) and growth in ROA both initially worsened and then improved later.⁴¹ González-Páramo and De Cos studied 33 Spanish manufacturing firms following privatization over 1983–1996 and concluded that real value-added increased.⁴² Brown, Earle and Telegdy found positive

average productivity effects that appeared immediately in Hungary, Romania, and the Ukraine, but only emerged four years later in Russia.⁴³ Although the time frames in these studies were longer than the more common six-year window, none of these studies actually examined what we would consider to be long run privatization performance effects.

Most recently, Boardman, Vining and Weimer examined the long run effects (up to 24 years) of privatization on productivity based on an examination of 11 major, mostly federal, share-issue privatizations in Canada.⁴⁴ They included in their study the privatization of PCS. Their analysis of PCS covered the period from its existence as a SOE in 1984, through the privatization period, and concluded at 2011. Apart from the before-after comparison, they did compare the performance of PCS and other privatized Canadian firms to a control group of always privately owned companies, including Mosaic, another Saskatchewan potash producer and integrated fertilizer company. They controlled for several factors that might affect productivity apart from privatization by including a panel of firms that had always been state-owned and one of always privately-owned firms. Their major finding was that the productivity of privatized firms increased relative to SOEs at a decreasing rate, peaking at approximately 14–16 years. Despite this improvement, the productivity of privatized firms continued to lag that of firms that have always been privately owned.

In aggregate, what do these longer run privatization studies tell us about the process of productivity change? After reviewing these studies, Boardman, Vining and Weimer concluded that productivity changes and improvements from privatization took many years to unfold and stabilize: thus, “privatization is a process, not an event.” This is primarily because managerial responses to their new, more complex, strategic environments take quite a few years to fully develop.⁴⁵ In effect, there is an extended strategic “experience curve” or “learning curve” effect.⁴⁶

We now turn to a specific examination of the before-and-after privatization performance of PCS, treating 1984–1988 as the pre-privatization period and 1990 to 2011 as the post-privatization period.

POTASH CORPORATION “BEFORE AND AFTER” PRIVATIZATION PERFORMANCE

In addition to the absence of an observable counterfactual or a reasonable proxy for one, there are several other problems with a before-after comparison of PCS performance. First, there are data limitations: complete performance data for PCS as a SOE only extends back to 1984. Accordingly, the period 1984-1988 is taken to be the pre-privatization period. This lack of complete data for the pre-privatization period may bias the results, as PCS as a SOE appeared to have enjoyed considerable success during the 1977-1981 period before the potash price fell precipitously due to a strong contraction in American agriculture.⁴⁷ In particular, after a slump in the potash market in the late 1960s, the market recovered in late 1973. U.S. potash consumption increased at an average annual rate of 6.3% between 1975 and 1981. However, this period was followed by another price slump in late 1981. The 1986 price was half of the 1981 peak, largely due to the American farm policy of reducing acreage, combined with a major drought. From 1983-1985, U.S. potash consumption declined on average by 2.5% per year.⁴⁸

Second, privatization occurred in tranches, so there was an interim period of mixed ownership. To deal with this, the performance of PCS as a SOE is first compared with its performance as a fully privatized firm, using the period 1994-2011 as the post-privatization period. However, the pre-privatization period is also compared with the entire period from 1990 to 2011, which includes the mixed ownership period.⁴⁹

Third, PCS performance in the late 2000s was dramatically affected by the surge in potash prices after 2007. In US 1998\$, prices fluctuated around \$200 per tonne over the whole period from 1945 to 2005 (with cycles). But there was a very big increase in 2007-9: in current \$US, the price rose from \$175 in February, 2007 to \$872 by February, 2009. In 2009, the price then slumped, falling to around \$400 by December.⁵⁰ Calculated in real, 2011 Canadian dollars, the spot price from 1984 to 2006 fluctuated between \$160 (1987)

and \$233 (1999). But then it skyrocketed to \$751 in 2009, dropped back to \$352 in 2010 and rose again to \$430 in 2011.⁵¹ Including the post-2007 data clearly skews the results, as the huge increases in revenues and profits in this period reflected the rapid price increases to a great extent. To counteract any possible bias introduced by this price surge, the pre-privatization period is also compared with the 1994-2007 post-privatization period.

A final comparison issue is that, over time, PCS has become a more diversified, multinational fertilizer company, with share acquisitions in foreign potash producers and in nitrogen and phosphorus firms. In 1991, PCS acquired both Florida Favorite Fertilizer, a full range fertilizer company, and Horizon Potash, a New Mexico potash producer. In 1995, PCS then acquired phosphate producers Texasgulf (doubling PCS assets and employees) and White Springs Agricultural Chemicals. This was followed by the acquisition of a nitrogen producer, Arcadian Corporation, based in Canada and the largest global producer of nitrogen fertilizer products.⁵² Unfortunately, from a comparative perspective, given that PCS embarked on the strategy of diversifying into nitrogen and phosphates almost immediately after the Saskatchewan government sold its final shares, there is no way to compare a fully privatized, potash-focused PCS with a fully equivalent SOE.

In Table 1, we summarize annual averages for several performance indicators for PCS. We divide them into five periods: the 1984-1988 period (the pre-privatization years for which we have data), the 1990-2011 period (the entire post-privatization period, including the short period of mixed ownership), the 1990-2007 period (the entire post-privatization period, excluding the years of the potash price surge), the 1994-2011 period (the entire period of complete private ownership) and the 1994-2007 period (complete private ownership, but excluding the price surge years). We calculate averages (in inflation-adjusted, 2011 Canadian dollars, unless otherwise indicated) for: net income, sales revenues, assets, employment, dividends paid and taxes paid. We also show the tax-to-sales ratio, two measures of profitability, return on sales (ROS = net income divided by sales) and return on assets (ROA = net income divided

TABLE 1**Potash Corporation of Saskatchewan performance, annual averages pre- and post-privatization**

All data in Canadian Dollars	Burton Pre-Privatization 1976-88	Pre-Privatization 1984-88	Post-Privatization 1990-2011	Post-Privatization Without Price Surge 1990-2007	Post-Full Privatization 1994-2011	Post-Full Privatization Without Price Surge 1994-2007
Net Income (2011\$ millions)		-25	691	286	829	348
Sales Revenue (2011\$ millions)		461	3962	3095	4736	3842
Assets (2011\$ millions)		2385	7709	6112	8996	7311
Employment		1615	4330	4091	4976	4852
Dividends (2011\$ millions)		6	95	81	108	93
Taxes (2011\$ millions)		7	230	112	281	144
PCS Tax/Sales ratios		-2.6%	5.8%	3.6%	5.9%	3.8%
Burton: Saskatchewan Potash Tax/Royalty Revenues (2011 millions)*	280	96	236	179	273	210
Burton: Saskatchewan Potash Tax/Sales Ratios*	15.86%	7.29%	8.54%	8.77%	9.11%	9.57%
PROFITABILITY						
ROS (%) = Net Income/Sales		-12.4%	14.2%	10.6%	14.2%	9.5%
ROA (%) = Net Income/Assets		-1.0%	7.1%	4.6%	7.8%	4.9%
PRODUCTIVITY						
Sales/Employee (2011\$ millions per person)		296	819	679	925	775
Sales/Asset (pure ratio)		0.19	0.48	0.46	0.53	0.52
Average Spot Price of Potash (2011\$) **		190	269	209	288	215

Data source: Boardman, Vining and Weimer, "The Long-Run Effect of Privatization on Productivity in Canada" unless otherwise indicated.

*Source: Burton, Potash, 194-195.

**Sources: https://ycharts.com/indicators/potassium_chloride_muriate_of_potash_spot_price; <http://fx.sauder.ubc.ca/data.html>; <http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/econ46b-eng.htm>; <http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/econ46c-eng.htm>; authors' calculations.

by total assets) and two measures of productivity, labour productivity (sales divided by number of employees) capital productivity (sales divided by total assets). In order to introduce some control (or at least information) about the possible effects of the potash price on the performance indicators, Table 1 also shows the average annual, real Canadian 2011\$ spot price of potash for the same five time periods.

It seems clear that by any measure PCS performance improved after partial, and especially after complete,

privatization when either situation is compared to the 1984-1988 period. And there is at least some evidence to indicate that this was not simply due to a more favourable environment. The real potash price was higher during the post-privatization period, but not dramatically so if we exclude the 2008-2011 data points. Even doing so, all the profitability and productivity measures show significant improvement after privatization. However, it is less clear whether the benefits of these improvements resulted in net gains for residents of Saskatchewan.

This determination depends largely on (1) the taxes collected by the Saskatchewan government, which we discuss in the next section, and (2) the residency of the owners of the privatized PCS.

Warnock quotes from the PCS 2004 Annual Report; this report claims that long-term investors realized a cumulative return of 629% over the 14 post-privatization years (1991-2004) compared to the (fertilizer) industry average cumulative return of 89% over that same period.⁵³ Initially, most PCS shares were sold in Canada (and in Saskatchewan, according to FundingUniverse.com; 11 of approximately 13 million of shares sold in the first tranche of the initial public offering).⁵⁴ This was followed by sales of another approximately one-third of the remaining shares in 1991 and of the final shares in 1993 and early 1994. There does not appear to be any evidence of underpricing of the first tranche of shares,

as returns to PCS shares were negative from day one to day three following the initial public offering.⁵⁵ By 1995, Warnock claims that US share ownership had risen to approximately 80%.⁵⁶ However, the Conference Board of Canada states that by 2010, 49% of shares were owned by Canadians.⁵⁷ Given this discrepancy and resulting uncertainty about ownership residency, it is difficult to say how much of the extraordinary gains to PCS shareholders after privatization went to residents of Saskatchewan. But it seems reasonable to conclude that any gains were quite small, as shares became broadly held in both the US and Canada after privatization. On the other hand, the evidence on the share of the rents earned by Saskatchewan residents from taxes and royalties is more mixed. We now turn to a discussion of how ownership might affect these.

PRIVATIZATION AND THE EXTRACTION OF SCARCITY RENTS

Even in a perfectly competitive industry, owners of a scarce resource (for example, land with potash deposits underground) will earn above average rates of profit (known as rents: payment in excess of the opportunity costs of all factors of production, including a reasonable return on investment). The reason is that, for infra marginal producers with higher grade or easier-to-mine reserves, potash can be extracted at a per-unit cost that is below the market price. In a competitive market, the price will equal the unit cost of the highest (marginal) cost producer, the one with the lowest grade or most difficult to extract reserves that can sell to the market. The scarcity or differential rent for any producer will equal the difference between its extraction and processing costs and those of the marginal producer. These rents flow to the owner of the higher grade reserves. To the extent that miner/producers are also reserve owners, these rents accrue to potash miner/producers. Since PCS (and Saskatchewan potash firms in general) are among lowest cost producers of potash in the world, with unit costs likely being around US \$100 per tonne as against a market price in 2011 of US \$435 per tonne, these rents would be substantial.⁵⁸ Constitutionally, the people of Saskatchewan own its natural resources, including any mineral and other deposits, so they have a superior legal right to these rents.

Dynamic models of the optimal extraction of a non-renewable resource also posit that there will be additional rents earned in equilibrium, as the eventual exhaustion of the resource leads to steadily rising resource prices. In a competitive equilibrium, the owner of the resource will receive a compensation for extracting the non-renewable resource that leaves them just indifferent between producing today and producing in the future. However, while the standard Hotelling model⁵⁹ predicts this rent on every unit extracted, the model does not accurately either predict or explain the empirical facts.⁶⁰ In particular, the real price of potash has not consistently risen over time in the way that the model predicts. As discussed, the price has tended to

fluctuate with commodity cycles, and more recently has slumped to US \$154.⁶¹ One reason may be that there is no real imminent threat of the exhaustion of the resource. Current predictions suggest that potash reserves outside of Canada will last approximately 280 years at current rates of extraction, while those in Saskatchewan will last 490 years.⁶² At rates of extraction that prevailed in the 1970s and 1980s, Saskatchewan reserves were predicted to last two or three thousand years.⁶³ Further, there is some reason to believe that private producers do not take an inter-generational view when determining the optimal path of extraction of a non-renewable resource.⁶⁴ Henceforth we will ignore for the most part any rents and issues arising from the finiteness of the reserves, and assume that private firms will simply seek to maximize current rents.

There are various policy instruments that can be used to extract rents: taxes (also known as royalties) on output, on the value of output, on measures of accounting profit, on pure economic profit (rents); competitive bidding for access to reserves; partial or complete public ownership. There are numerous studies that seek to assess the effects of the various instruments on both static efficiency (producing the economically efficient output in any period) and on dynamic efficiency (achieving the optimal rate of extraction over time).⁶⁵

In order to consider the economic impact of the privatization of PCS, it is necessary to clearly specify which policy instrument is being used to assess the current regime and any counterfactual cases. There are several possible choices. (1) The actual tax and royalty regime of the privatized PCS could be compared to a counterfactual based on the continuation of PCS as a SOE with the same system of taxes and royalties. (2) Privatization could be compared with PCS as a SOE under a hypothetical optimal set of royalties and taxes. (3) The actual historical situation could be compared to a counterfactual that includes a hypothetical increase in the share of Saskatchewan output by a SOE PCS, with complete public ownership of the potash resources replacing the actual system of royalties and taxes. The choice of the counterfactual matters for any analysis, because the system of royalties and taxes actually used in Saskatchewan has been described as “incoherent” and “absurd”.⁶⁶ It has likely created both significant

economic inefficiency and failed to maximize the province's share of any rents.

To begin, it will be useful to summarize some of the key points from the literature on taxation of non-renewable resources. This literature evaluates the ability of a government to share in the scarcity rents of a non-renewable resource through the use of the various potential policy instruments, and attempts to propose an optimal tax and royalty system. The normative goal is to maximize the government's capture of the scarcity rents. There are three broad classes of instruments: (1) royalties, that is, special taxes applied to the non-renewable resource industry; (2) competitive bidding for the right to explore, develop, mine and process the resource, or (3) some form of complete or partial government ownership, ranging from some public equity in the resource firms to complete nationalization.

Taxes

Specific taxes on non-renewable resources are known as royalties. Within this broad class of instrument, there are many variations: these can be taxes on physical output, on the value of output (revenues), or on revenues minus some measure of costs. The cost measures could include only current costs, or could also include capital costs. If they include all economic costs, then the royalty effectively becomes a tax on pure rents. A tax on physical output is easy to administer and hard to avoid, so this kind of tax regime is quite attractive to governments and is often used. However, it creates an inefficient allocation of resources because it can reduce both the rate of current extraction and the amount of exploration and investment relative to their efficient levels. It also does not capture much of the windfall that occurs if and when prices suddenly increase. Allowing some but not all costs to be deducted and basing the royalty on the value rather than the quantity of output mitigate these problems somewhat, but still result in inefficiency.

Many analysts consider a pure rent tax to be ideal because it does not distort the allocation of resources that would occur in the absence of any taxes. That is, given certain assumptions, the regime would achieve full static and

dynamic efficiency.⁶⁷ And, from an equity point of view, the scarcity rents that result from the advantageous resources belong to the public and so should go to them. A tax on pure rents could be achieved by taxing the difference between all current cash revenues and all current cash costs, where the latter include all expenditures, whether for current operations, or capital costs for exploration or development. However, since new and growing firms would experience negative tax liabilities, this requires either that the government fully refund these, or that the future value of initial losses be carried forward and used to offset future positive tax liabilities if and when firms become profitable, with the future values calculated at the firm's cost of capital. Chen and Mintz essentially propose the latter as a pure rent tax for Saskatchewan potash.⁶⁸

In principle, the rate of tax on pure rents could be set at anything up to 100%, although in practice rates are always set at less than 50%.⁶⁹ However, if rents are not accurately measured then setting too high a rate risks discouraging economically valuable activity. Given this risk, the tax rate is unlikely to be set high enough to capture all the rents. Further, if the rate were to be set at 100%, the firm would have little incentive to hold down costs in order to achieve productive efficiency, since any increase in costs simply decreases the rents going to the government. The rents could be measured using hypothetical costs, leaving full incentives to achieve productive efficiency. But doing so in practice requires that a government has good information about achievable costs, and it is inevitably at an informational disadvantage relative to the firms. A further problem arises if some costs are joint and the firm is a diversified multinational. This kind of firm can use transfer pricing to shift rents out of province to avoid any potential taxation. As a consequence, Mintz and Chen argue for a minimum tax on revenues that would be deductible against rent taxes paid as a way of dealing with this problem.⁷⁰ Any system of taxes and royalties will also inevitably be subject to lobbying by the industry. Finally, if governments cannot credibly commit to maintaining a given tax system, privately owned firms will speed up extraction if they fear that taxes will be raised in the future, which they nearly always fear.

Auctions and Competitive Bidding

Another means of capturing the scarcity rents (and, indeed, any rents flowing from the ability to exercise market power) is to auction the right to exploit the resource. If there were a sufficiently large number of equally well-informed, competitive bidders, then an auction could extract 100% of the present value of all the future expected rents. The proceeds would accrue to the government *ex ante*, rather than be spread over time as would occur with the tax on rents. However, the government could solicit bids for the annual price of a lease, in which case the revenues would be spread over time. But in this case, if actual rents turned out to be less than anticipated, the firm could walk away from the agreement to lease. An *ex ante* auction would shift all the risk to the firm, unlike the rent tax scheme. However, this risk transfer is likely to result in inefficiency, as governments are generally better able to pool and bear risk than are private firms.⁷¹ There are two further drawbacks to an auction system that can reduce the government's ability to extract scarcity rents. The first is that current governments cannot credibly commit future governments to not impose additional taxes, should higher than anticipated rents occur. By a process of backward induction, this inability to commit future governments results in lower bids, with less than full rent capture. Secondly, lower bids might result from collusion in bidding. Finally, as a practical matter, an auction system would have to be imposed prior to initial exploration and development. Given that much of the Saskatchewan potash reserves have already been discovered and production has taken place for several decades, it is not feasible now to undertake competitive bidding for existing production, nor was it in 1989, although it could be used in the future.⁷² Garnaut recommends using a tax on pure resource rents for new mine development and brownfield expansion, combined with competitive bidding at the exploration stage.⁷³

Public Participation in Ownership

The last alternative for rent capture is some form of public equity participation. This could be partial, as was the case for PCS from 1989 to 1993, or complete as occurred from 1976-1988.⁷⁴ If the government

pays the full market price for a privately-owned firm, then presumably all the expected future rents have been capitalized into the sale price and this earns no anticipated rents for the public. If the purchase price is instead set equal to the present value of all or some of the past and current cash costs, then this is equivalent to a tax on pure rents of 100% or less, depending on the government's assumed share of the costs. In contrast to the rent tax, the government's ownership share would presumably gain it access to the same information on costs as the private firm has, and could prevent any tax avoidance that might be achieved with transfer pricing.

In the case of full government ownership of the industry, all informational asymmetries, the potential for tax avoidance or evasion and the incentives for private lobbying would be eliminated, and fewer tax distortions would occur. There would be no issues flowing from the inability of the government to commit to a future set of taxes. Provided that the government uses the appropriate social discount rate to determine the optimal rate of extraction, then the interests of future generations are correctly taken into account.⁷⁵ However, the SOE would be unlikely to achieve productive efficiency, especially without any private competitors in the same jurisdiction, and might dissipate any potential rents through the pursuit of non-economic objectives. In other words, all the productive efficiency problems of SOEs discussed earlier might occur.

Alternatively, the government could take partial shares in all the private firms. The theory on mixed or hybrid enterprise indicates that there are many possible outcomes in this case, from the best of both worlds to the worst of both.⁷⁶ In the best case, the private owners would press for productive efficiency, while the government would be able to capture rents without having to devise a complex system of measuring and taxing rents. In the worst case, agency problems would worsen due to conflicts between public and private owners and managers. And rent capture would be less than 100% by definition.

Using our before-after data (Table 1), we calculate that the Saskatchewan government earned rents in the pre-privatization period through the combination of PCS's net income, dividends and (provincial) taxes paid. These

data show that, due to PCS losses, this amounted to an average annual net loss from PCS of 2.6% of its sales. In contrast, for the full post-privatization period, taxes paid by a partially or fully privatized PCS amounted to 5.8% of sales, 3.6% of sales if the price surge period is excluded, and 3.8% of sales for the full privatization period excluding the price surge. Note, however, that these data include federal taxes paid post-privatization, and do not include provincial taxes paid by other producers to Saskatchewan.

In terms of assessing the total welfare gains to Saskatchewan, it is more appropriate in a CBA to exclude the taxes paid to the federal government, and to include taxes paid by all Saskatchewan potash producers. Burton supplies annual data on Saskatchewan potash producers' sales revenues, and on potash taxes and royalties paid to the province from 1976 through 2011.⁷⁷ In our before-after data, we show the averages for the complete Burton pre-privatization period (1976-1988), as well as for our five periods, both for real tax revenues collected (deflating by the Consumer Price Index, all-items) and for the tax-to-sales ratio. As can be seen, if one includes the entire Burton pre-privatization period, both the tax-to-sales ratio and the total tax collected by the Saskatchewan government from potash were higher in this earlier period than in any of the post-privatization periods.

According to Warnock, the very low royalty rates of 1–4% on sales revenues that the CCF/NDP governments initially imposed on the industry were continued under Ross Thatcher's Liberal government in the 1960s and were extended to 1981.⁷⁸ However, in 1974 the Blakeney NDP government introduced a new reserve tax and increased the royalty rate from 3.8% of sales to 20.7%.⁷⁹ At the same time, the federal government eliminated the ability of firms to deduct provincial royalties paid for federal corporate income tax purposes. This resulted in court cases against the provincial government brought by the potash producers, and eventually a refusal to invest. These facts, coupled with the fact that provincial Crown Corporations are not subject to federal corporate income tax, led the NDP to create PCS in 1975.⁸⁰ By 1979, the NDP had introduced a tax on: revenues minus operating costs minus a depreciation allowance (an overstatement of rents),

and the remaining private producers were paying approximately 25% of sales revenues in royalties.⁸¹ However, the tax-to-sales ratio declined to 5.4% in the first term of the Devine Conservative government, and rose slightly to about 6% during the second term.⁸² As mentioned above, critics have characterized the recent tax system as being "incoherent," "absurd" and "hard to comprehend"! However accurate these criticisms are, the system appears designed to support the potash industry rather than to maximize the NPV of the resource rents for Saskatchewan residents. Chen and Mintz find that the potash industry enjoys much lower effective tax rates on marginal investments than does, for example, the oil and gas sector. They also conclude that it is a complex and inefficient tax structure with different rates applied to different producers.⁸³

Thus, in terms of rent extraction, we can compare privatization under the actual system of taxes and royalties to counterfactual of PCS as a SOE. *Ceteris paribus*, one would expect more rents to be captured for Saskatchewan residents in the counterfactual case. First, some of the distortionary effects of the current royalty and tax system would be reduced if output or *ad valorem* taxes were replaced by public ownership of part of the industry. Second, the rents earned by PCS would accrue directly to the province. However, the ease of rent extraction must be balanced against the likely greater productive efficiency of the privatized PCS. But simply looking at the tax collected data from Burton, one might conclude that the period of SOE and higher taxes did generate a higher share and greater total amount of rents for residents of the province than did the period of privatization and lower taxes and royalties.

Thus far we have compared privatization of PCS to a counterfactual of PCS as a SOE with the current tax and royalty system. Instead, one can compare the privatization of PCS to SOE, but with an optimally designed tax and royalty system in either case, along the lines suggested by Broadway and Flatters, Garnaut or Chen and Mintz.⁸⁴ With an optimal tax regime, it is more likely that the losses due to lower productive efficiency with a SOE would outweigh any gains from greater rent capture and the reduction of tax distortions. However, the actual function of an optimal

tax system requires the government to accurately measure private costs and revenues. A SOE would facilitate greater access to cost information with which to design optimal rent taxes on the remaining private producers. Properly designed taxes on pure rents might then gain Saskatchewan residents a greater share and a greater total amount of the rents. Full government

ownership of the industry would of course eliminate all of the informational asymmetries and maximize the share of rents captured (as well as rendering moot any problems of tax avoidance), but would also presumably worsen the productive efficiency for all the reasons discussed earlier.

PRIVATIZATION AND THE EXERCISE OF MONOPOLY POWER

Did the transfer of ownership of PCS from public to private hands (many of those not belonging to Canadians and most not belonging to residents of Saskatchewan) affect the ability of Canadians or residents of Saskatchewan to maximize and share any potential rents due to monopoly power? Monopoly rents differ from the scarcity or differential rents that are due to owning lower cost, higher quality reserves. Both represent above normal returns to investors. However, even if there were no rents due to lower costs of extracting specific reserves, there can still be monopoly rents if there are entry barriers, since these allow firm owners to earn above average returns without attracting any new entry that might compete those returns away. The two types of rents are related, in that if the firm owns the scarce reserves, and ownership is required for entry, then this ownership itself acts as an entry barrier. But the ownership of the reserves need not be logically connected to the ownership of the firm.

In the case of potash, there are a very limited number of locations with known, low-cost reserves, the large majority of which are found in Saskatchewan, Belarus and Russia. Around half the global potash reserves are in Saskatchewan.⁸⁵ As a province, Saskatchewan produced 13.3% of global potash production in 1970, 26% in 1979, 25.4% in 1990, 29% in 2010 and nearly 37% by 2012.⁸⁶ The Saskatchewan reserves were mined in 10 locations by 9 private firms in 1970, only two of which were Canadian. By 1980, after the creation of PCS as a SOE and its various acquisitions, there were 6 producers in Saskatchewan, all Canadian.⁸⁷ After privatization, the potash industry in Canada continued to consolidate, such that by 2004 there remained but three producers: PCS, Mosaic and Agrium. By 2010, these three firms owned around one-third of the operational potash capacity in the world.⁸⁸ K+S and BHP Billiton are both planning new mines in the province at the time of writing, although these plans are on hold due to the current, low price of potash.⁸⁹ If the proposed merger between PCS and Agrium is approved by the various competition authorities, the number of active Saskatchewan producers will shrink to two.⁹⁰

The North American producers independently market their output in the US, but all non-North American exports are jointly marketed through Canpotex, an exporting cartel that has existed since 1972. All producers have one vote, and currently PCS has 54% market share in Canpotex.⁹¹ While Saskatchewan as a province has had a large and increasing share of global potash production, it has an even bigger share of the US market. To the extent that markets are segmented, it appears that the province is dominant in the US and that its producers collude in exporting elsewhere.⁹²

Al Rawashdeh and Maxwell assert that "the potash market has been imperfectly competitive for more than a century and continues to be that way."⁹³ Taylor and Moss conclude, after anecdotal and empirical study, that there is a continuing history of significant market power and cartel-like behaviour in the global fertilizer industry, including potash. They argue that there are two, dominant potash exporting cartels: Canpotex, and the Belarusian Potash Company (BPC), although the latter apparently collapsed in late 2013 after the departure of Uralkali.⁹⁴ There is also a competitive fringe of producers, but the two cartels set prices (possibly collusively) through large contracts in major exporting markets like India and China, while independently affecting prices in North American (Canpotex) and Europe (BPC). Part of the anecdotal evidence is that, in comparison to previous 10 years, the North American price was 25% higher than offshore price for 2008-2012 period, which cannot be easily explained by transport cost differences.⁹⁵

In the period leading up to the privatization of PCS, there was no Belarusian-Russian export cartel, but Flatters and Olewiler analyze the North American market as an oligopoly with PCS having a dominant share. They conclude that the evidence, while not strong, cannot reject a hypothesis of non-collusive Cournot behaviour.⁹⁶ They conclude PCS could have made more rents by acting as a "Stackelberg leader", which may be one reason why PCS wanted to leave Canpotex in 1981 and create its own international marketing arm.⁹⁷ PCS only had one vote in Canpotex, yet it had the dominant share of output and reserves and the lowest costs, and was constrained by other members in its ability to expand its share of world markets. However, in 1982 the Devine government decided to keep PCS in

Canpotex, and that any subsequent expansion of the potash industry would be undertaken by the private firms.⁹⁸

Given the evidence, it seems reasonable to assume that the Saskatchewan industry collectively does have market power through Canpotex, and PCS as the largest firm also has and did have some ability to earn rents due to its market power. If so, PCS most likely behaves as a Cournot oligopolist; that is, it chooses its output rate in order to maximize its own rents (given its beliefs about its rivals' production plans) when selling into the US market. It seems likely that Canpotex, as well, has operated as an oligopolist when selling to the rest of the world. However, it is not clear that each firm's share of Canpotex output has been assigned optimally, with the lower cost firms getting larger shares of output. Output shares may well be based on bargaining power or political considerations, rather than production cost. Given reasonably successful achievement of Cournot-like output levels, it is quite plausible that PCS was able to earn at least some rents from the exercise of market power. The most relevant question for our purposes is: does the nature of the ownership of the firm affect the size of these rents or who gets them? To the extent that these rents could be, and were, anticipated in advance, they would have been captured in the sale price of PCS when it was privatized. To the extent that they were not fully anticipated, however, the owners of firms acquired by PCS would have captured some of the rents as PCS increased its market share and market power through acquisitions and mergers.

How would the goal(s) of PCS change based on ownership? Assuming that a government attempts to maximize the NPV of potash reserves for its citizens (keeping in mind that many governments appear instead to try to maximize government revenues), a SOE would seek to maximize the combination of the before-tax rents earned by PCS and the taxes and royalties collected from any privately-owned Saskatchewan potash producers. In contrast, if PCS were privately owned, then one would expect the firm

to seek to maximize its after-tax profits. So a state-owned PCS that could increase its market share at the expense of other Saskatchewan (private) producers in the North American market, for example, would benefit the government to the extent that the added PCS rents exceeded any foregone tax and royalties from the private domestic producers. But a privatized PCS expansion would only benefit the government's revenues if it displaced higher cost domestic rivals' production. Since PCS as a SOE was operating on a commercial basis, it is difficult to say whether or not there was any change in the firm's goal(s). So it will be assumed for simplicity that the single goal was rent maximization before and after privatization.

An earlier conclusion was that productive efficiency is superior under private ownership when compared to the counterfactual of a SOE. Given this, it seems reasonable to conclude that the operating or variable cost of production decrease we observe in the PCS case resulted from its change in ownership. If the firm competed as a Cournot firm in the US, this would have increased its market share and rents relative to what it would have earned without this productivity improvement. In addition to the increased rents due to the lower costs on its initial sales, it would have increased its rent share due to its improved competitive position *vis-à-vis* its competitors. In the rest of the world (assuming that the global market can be segmented), if its market share within Canpotex was actually constrained by the effectiveness of the actions of other members, it would have been unable to earn additional rents from increased sales based on its lower production costs. However, if its market share of Canpotex output did increase to reflect its lower costs, it would enjoy commensurate increases in foreign sales and rents earned from these. In either case, these gains would largely have gone to PCS shareholders, who were for the most part non-residents. The government and people of Saskatchewan would only benefit through any higher taxes paid provincially on the greater sales and rents.

CONCLUSION

What can be reasonably concluded about the effects of the privatization of the Potash Corporation of Saskatchewan on the economic well being of provincial residents? We posed three questions: (1) How did the privatization affect the productive efficiency of PCS? (2) To what extent did the privatization benefit or hinder the ability of the Saskatchewan government to extract its share of the scarcity resource rents? (3) (How) did the change from a SOE to private ownership impact the ability of the province to share in any potential monopoly rents?

On the first question, the performance of PCS after partial, and (especially) after full privatization clearly indicates that the privately-owned firm outperformed the SOE both in terms of productivity and profitability. It seems reasonable to conclude that much of this improvement did derive from the change in ownership. However, the increased profits did appear to accrue mainly to non-residents, as shareholding has become broadly distributed with less than half the PCS shares owned by Canadian residents, and likely a very small fraction of these owned by Saskatchewan residents.

As to the second question, the limited evidence indicates that, given the system of taxes and royalties on potash producers, on average a greater share and a greater total amount of the rents went to Saskatchewan citizens when PCS was a SOE than was the case after privatization (especially after full privatization). It is unclear what would have transpired under a much better designed tax and royalty system. (Of course, the design of this system is within the purview of the government.) There would likely still have been greater productive efficiency with private ownership, and so greater rents produced, but also it is likely that a smaller share of any rents would have been captured as compared to a situation with significant public ownership.

With respect to the third and final question, it is not clear that the ownership difference has changed PCS's focus on profit maximization, although privatization would largely have eliminated any non-profit objectives. A reasonable inference is that any lower operating costs due to productive efficiency improvements under

privatization have increased market share and rents under oligopolistic competition in the US market, in addition to any rent gains simply due to lower costs at an unchanged market share. But these rents have largely accrued to non-residents. As PCS was already a member of Canpotex, which exploits Saskatchewan market power in non-US export markets, it is not obvious that privatization has increased its ability to gain monopoly rents elsewhere (although it should be noted that PCS had announced its decision to leave Canpotex prior to privatization; that decision was subsequently reversed by the Devine government). If a state-owned PCS had expanded through acquisitions to the point where it produced 100% the output of Saskatchewan potash, this would have clearly maximized its market power and its share of any monopoly rents. However, these additional rents may simply have been capitalized into sale prices during any potential takeovers and mergers. In any case, they would have to be set against a likely reduction in productive efficiency and a potential loss of market share due to higher costs in oligopolistic competition in North American and in global markets.

There is no particular evidence that the Devine government "left any money on the table", at least in the initial public offering of PCS shares, as there is no evidence of underpricing. There may have been some lost income taxes as senior management moved to Chicago in the late 1990s, but that loss was averted after the failed BHP Billiton takeover when the firm pledged to keep its head office in Saskatoon.

Overall, despite the data limitations, there is every reason to believe that a privatized PCS is more efficient, operates at lower cost and is more profitable than a state-owned PCS would have been. But given the (very) sub-optimal system of taxes and royalties on Saskatchewan potash production, and given the wide dispersion of shares to non-residents, it seems most likely that nearly all of these gains were earned by foreigners and other Canadians. It seems unlikely that the firm's market power was greatly affected, especially outside of North America as an export cartel comprising all of the Saskatchewan producers already existed prior to 1989. In conclusion, a better designed tax and royalty system, combined with privatization (possibly including some minority government ownership) could gain and could

have gained more of the substantial post-privatization rents earned for the people of Saskatchewan. Not only is privatization a process, not an event, but so is better

institutional design in general, including an improved tax and royalty regime.

BIBLIOGRAPHY

- Alchian, A.A.** and H. Demsetz. "The Property Rights Paradigm." *Journal of Economic History* 33:1 (1973): 16-27.
- al Rawashdeh, R.** and P. Maxwell. "Analysing the World Potash Industry." *Resources Policy* 41 (2014): 143-151.
- al Rawashdeh, R.,** E. Xavier-Oliveira and P. Maxwell. "The Potash Market and Its Future Prospects." *Resources Policy* 47 (2016): 154-163.
- Bloom, N.,** C. Genakos, R. Sadun and J. Van Reenen. "Management practices across firms and countries." *Academy of Management Perspectives* 20:1 (2012): 12-33.
- Boadway, R.** and F. Flatters. *The Taxation of Natural Resources: Principles and Policy Issues*. The World Bank: Policy Research Department, Working Paper Series, No. 1210, 1993.
- Boardman, A.E.,** C. Laurin, M.A. Moore and A.R. Vining. "A Cost-Benefit Analysis of the Privatization of Canadian National Railway." *Canadian Public Policy* 35:1 (2009): 59-83.
- Boardman, A.E.,** C. Laurin and A.R. Vining. "Privatization in Canada: Operating and Stock Price Performance with International Comparisons." *Canadian Journal of Administrative Sciences* 19:2 (2002): 137-154.
- Boardman, A.E.** and A.R. Vining. "A Review and Assessment of Privatization in Canada." University of Calgary School of Public Policy Research Papers, Volume 5, Issue 4, 2012.
- Boardman, A.E.** and A.R. Vining. "Ownership and Performance in Competitive Environments: A Comparison of the Performance of Private, Mixed and State-Owned Enterprises." *Journal of Law and Economics* 32:1 (1989): 1-33.
- Boardman, A.E.,** A.R. Vining and D. Weimer. "The Long-Run Effect of Privatization on Productivity in Canada." Forthcoming in *Journal of Policy Modeling* (2017).
- Bortolotti, B.,** J. D'Souza, M. Fantini and W.L Megginson. "Privatization and The Sources of Performance Improvement in The Global Telecommunications Industry." *Telecommunication Policy* 26:5/6 (2002): 243-269.
- Boubakri, N.** and J.-C. Cosset. "The Financial and Operating Performance of Newly Privatized Firms: Evidence from Developing Countries." *Journal of Finance* 53:3 (1998): 1081-1110.
- Boubakri, N.,** J.-C. Cosset, N. Debab and P. Valéry. "Privatization and Globalization: An Empirical Analysis." *Journal of Banking and Finance* 37:6 (2013): 1898-1914.
- Boycko, M.** and A. Shleifer. "A Theory of Privatisation." *The Economic Journal* 106:405 (1996): 309-319.
- Brown, J.D.,** J.S. Earle and A. Telegdy. "The Productivity Effects of Privatization: Longitudinal Estimates from Hungary, Romania, Russia and Ukraine." *Journal of Political Economy* 114:1 (2006): 61-99.
- Burton, J.** *Potash: An Inside Account of Saskatchewan's Pink Gold*. Regina, Saskatchewan: University of Regina Press, 2014.
- Cavaliere, A.** and S. Scabrosetti. "Privatization and Efficiency: From Principals and Agents to Political Economy." *Journal of Economic Surveys* 22:4 (2008): 685-710.
- Chen, D.** and J. Mintz. "Fixing Saskatchewan's Potash Royalty Mess: A New Approach for Economic Efficiency and Simplicity." University of Calgary School of Public Policy Research Papers, Volume 6, Issue 7, February 2013.
- Chong, A.,** and F. López-De-Silanes. "Privatization in Latin America: What Does the Evidence Say?" *Journal of the Latin America and Caribbean Economic Association* 4:2 (2004): 37-94.
- Conference Board of Canada.** *Saskatchewan in the Spotlight: Acquisition of Potash Corporation of Saskatchewan Inc. — Risks and Opportunities*. Presented to the Government of Saskatchewan, October 1, 2010.
- Cooper, B.** *Saskatchewan Political Culture and The Grant Devine Era*. Frontier Centre for Public Policy, August 2016.
- Corneo, G.,** and R. Rob. "Working in Public and Private Firms." *Journal of Public Economics* 87:7/8 (2003): 1335-1352.
- Crown Investments Corporation of Saskatchewan.** "History of Crowns," August 31, 2016. Available online at: http://www.cicorp.sk.ca/about_us/comimercial_crown_sector/history_of_crowns.

- Curvo, A.** and B. Villalonga. "Explaining the Variance in the Performance Effects of Privatization." *Academy of Management Review* 25:3 (2000): 581-590.
- De Alessi, L.** "Implications of Property Rights for Government Investment Choices." *American Economic Review* 59:1 (1969): 13-25.
- Djankov, S.,** and P. Murrell. "Enterprise Restructuring in Transition: A Quantitative Survey." *Journal of Economic Literature* 40:3 (2002): 739-92.
- D'Souza, J.,** W.L Megginson and R. Nash. "Effect of Institutional and Firm-Specific Characteristics on Post-Privatization Performance: Evidence from Developed Countries." *Journal of Corporate Finance* 11:5 (2005): 747-766.
- Estrin, S.,** J. Hanousek, E. Kočenda and J. Svejnar. "The Effects of Privatization and Ownership in Transition Economies." *Journal of Economic Literature* 47:3 (2009): 699-728.
- Fang, Y.,** I. Hasan and K. Marton. "Bank Efficiency in South-Eastern Europe: The Role of Ownership, Market Power and Institutional Development." *Economics of Transition* 19:3 (2011): 495-520.
- Flatters, F.** and N. Olewiler. "Dominant Government Firms in an Oligopolistic Industry: The Case of Saskatchewan Potash." Queen's University Centre for Resource Studies Working Paper No. 29, January 1984.
- FundingUniverse.** "History of Potash Corporation of Saskatchewan Inc." August 26, 2016. Available online at: <http://www.fundinguniverse.com/companyhistories/potashcorporationofsaskatchewanhistory/>.
- Garnaut, R.** "Principles and Practice of Resource Rent Taxation." *The Australian Economic Review* 43:4 (2010): 347-356.
- Ghemawat, P.** "Building Strategy on the Experience Curve." *Harvard Business Review* 63:2: (1985): 143-149.
- Ghosh, S.** "How Did State-Owned Banks Respond to Privatization? Evidence from The Indian Experiment." *Annals of Public and Cooperative Economics* 81:3 (2010): 389-421.
- González-Páramo, J.M.** and P.H. De Cos. "The Impact of Public Ownership and Competition on Productivity." *Kyklos* 58 (2005): 495-517.
- Hart, O.,** A. Shleifer and R.W. Vishny. "The Proper Scope of Government: Theory and Application to Prisons." *Quarterly Journal of Economics* 112:4 (1997): 1127-1161.
- Hartley, P.** and K.B. Medlock III. "A Model of the Operation and Development of a National Oil Company." *Energy Economics* 30:5 (2008): 2459-2485.
- Haskel, J.** and A. Sanchis. "Privatization and X-Inefficiency: A Bargaining Approach." *Journal of Industrial Economics* 43:3 (1995): 301-321.
- Heaps, T.** and J. Helliwell. "The Taxation of Natural Resources." Chapter 8 in *Handbook of Public Economics*, Vol. I, edited by A.J. Auerbach and M. Feldstein. Elsevier Science Publishers B. V. (North-Holland), 1985.
- Hotelling, H.** "The Economics of Exhaustible Resources." *The Journal of Political Economy* 39:2 (1931): 137-175.
- Knutson, C.H.,** A. Rygh and H. Hveem. "Does State Ownership Matter? Institutions' Effect on Foreign Direct Ownership Revisited." *Business and Politics* 13:1 (2011): Article 2.
- Kornai, J.** "The Soft Budget Constraint." *Kyklos* 39:1 (1986): 3-30.
- Krautkraemer, J.** "Non-Renewable Resource Scarcity." *Journal of Economic Literature* 36:4 (1998): 2065-2107.
- Land, B.C.** "Resource Rent Taxation—Theory and Experience." Working paper presented to the IMF Conference on Taxing Natural Resources, September 2008. Available online at: <http://www.imf.org/external/np/seminars/eng/2008/taxnatural/pdf/land.pdf>.
- Lin, J.Y.,** F. Cai and Z. Li. "Competition, Policy Burdens and State-Owned Enterprise Reform." *American Economic Review* 88:2 (1998): 422-427.
- Martimort, D.** "An Agency Perspective on the Costs and Benefits of Privatization." *Journal of Regulatory Economics* 30:1 (2006): 5-44.

- McNish, J.** and J. McKinnon. "Canadian Fertilizer Giants Agrium and Potash Agree to Merge." *Wall Street Journal*, September 12, 2016.
- Megginson, W.L.**, and J.M. Netter. "From State to Market: A Survey of Empirical Studies on Privatization." *Journal of Economic Literature* 39:2 (2001): 403-52.
- Moore, M.A.**, A.E. Boardman and A.R. Vining. "Risk in Public Sector Project Appraisal: It Mostly Does Not Matter!" Unpublished working paper, 2017.
- Moore, M.A.**, A.E. Boardman and A.R. Vining. "More Appropriate Discounting: The Rate of Social Time Preference and the Value of the Social Discount Rate." *Journal of Benefit-Cost Analysis* 4:1 (2013): 1-16.
- Mintz, J.** and D. Chen. "Capturing Economic Rents from Resources through Royalties and Taxes." University of Calgary School of Public Policy Research Papers. Volume 5, Issue 30, October 2012.
- Nellis, J.** "The International Experience with Privatization: Its Rapid Rise, Partial Fall, and Uncertain Future." University of Calgary School of Public Policy Research Papers, 2012.
- Otchere, I.** "Competitive and Value Effects of Bank Privatization in Developed Countries." *Journal of Banking and Finance* 33:12 (2009): 2373-2385.
- Pollitt, M.G.** "The Role of Policy in Energy Transitions: Lessons from The Energy Liberalization Era." *Energy Policy* 50 (2012): 128-137.
- Richards, J.** "The Saskatchewan Potash Industry: An Exercise in What Could Have Been." Chapter 8 in *Resource Rents and Public Policy in Western Canada*, edited by T. Gunton and J. Richards. Halifax: The Institute for Research on Public Policy, 1987.
- Robinson, J.A.**, and R. Torvik. "A Political Economy of the Soft Budget Constraint." *European Economic Review* 53:7 (2009): 786-798.
- Sappington, D.E.** and J.E. Stiglitz. "Privatization, Information and Incentives." *Journal of Policy Analysis and Management* 6:4 (1987): 567-581.
- Shleifer, A.** and R.W. Vishny. "Politicians and Firms." *Quarterly Journal of Economics* 109:4 (1994): 995-1025.
- Shleifer, A.** "State versus Private Ownership." *Journal of Economic Perspectives* 12:4 (1998): 133-50.
- Sheshinski, E.**, and L.F. López-Calva. "Privatization and its Benefits: Theory and Evidence." *CESifo Economic Studies* 49:3 (2003): 429-59.
- Spiro, D.** "Resource Prices and Planning Horizons." *Journal of Economic Dynamics and Control* 48 (2014): 159-175.
- Tauchmann, H.**, H. Clausen and M. Oelmann. "Do Organizational Forms Matter? Innovation and Liberalization in the German Wastewater Sector." *Journal of Policy Modeling* 3:6 (2009): 863-876.
- Taylor, C.R.** and D.L. Moss. *The Fertilizer Oligopoly: The Case for Global Antitrust Enforcement*. Washington, DC: The American Antitrust Institute, 2013.
- Vickers, J.**, and G. Yarrow. "Economic Perspectives on Privatization." *Journal of Economic Perspectives* 5:2 (1991): 111-132.
- Villalonga, B.** "Privatization and Efficiency: Differentiating Ownership Effects from Political, Organizational and Dynamic Effects." *Journal of Economic Behavior and Organization* 42 (2000): 43-74.
- Vining, A.R.**, and A.E. Boardman. "Ownership versus Competition: Efficiency in Public Enterprise." *Public Choice* 73:2 (1992): 205-239.
- Vining, A.R.**, A.E. Boardman and M.A. Moore. "The Theory and Evidence Pertaining to Local Government Mixed Enterprises." *Annals of Public and Cooperative Economics* 86:1 (2014): 53-86.
- Warnock, J.W.** *Exploiting Saskatchewan's Potash: Who Benefits?* Canadian Centre for Policy Alternatives — Saskatchewan Office, January 2011.
- Wu, H-L.** "The Policy-Fit View of the Efficiency Effects of Privatization." *Journal of Policy Modeling* 28:3 (2006): 281-292.
- Younglai, R.** "PCS-Agrium Deal Would Face Antitrust Hurdles." *Globe and Mail*, September 2, 2016.

ENDNOTES

1. J. Burton, *Potash: An Inside Account of Saskatchewan's Pink Gold* (Regina, Saskatchewan: University of Regina Press, 2014): 107-134; A.E. Boardman and A.R. Vining, "A Review and Assessment of Privatization in Canada," University of Calgary School of Public Policy Research Papers, Volume 5, Issue 4, 2012: 4; Crown Investments Corporation of Saskatchewan, "History of Crowns," August 31, 2016. Available online at: http://www.cicorp.sk.ca/about_us/commercial_crown_sector/history_of_crowns.
2. Burton, *Potash*, *ibid*; J.W. Warnock, *Exploiting Saskatchewan's Potash: Who Benefits?* Canadian Centre for Policy Alternatives — Saskatchewan Office, January 2011: 20.
3. Conference Board of Canada, *Saskatchewan in the Spotlight: Acquisition of Potash Corporation of Saskatchewan Inc. — Risks and Opportunities*, presented to the Government of Saskatchewan, October 1, 2010: 21-23.
4. R. al Rawashdeh and P. Maxwell, "Analysing the World Potash Industry," *Resources Policy* 41 (2014): 145.
5. J. McNish, and J. McKinnon, "Canadian Fertilizer Giants Agrium and Potash Agree to Merge," *Wall Street Journal*, September 12, 2016.
6. Boardman and Vining, "A Review and Assessment of Privatization in Canada," 4.
7. B. Cooper, *Saskatchewan Political Culture and The Grant Devine Era*, Frontier Centre for Public Policy, August 2016: 19.
8. Although Air Canada was privatized in 1988, the major federal privatizations occurred in the early and mid-1990s: Boardman and Vining, "A Review and Assessment of Privatization in Canada," 4.
9. In particular, see: F. Flatters and N. Olewiler, "Dominant Government Firms in an Oligopolistic Industry: The Case of Saskatchewan Potash," Queen's University Centre for Resource Studies Working Paper No. 29, January 1984; J. Richards, "The Saskatchewan Potash Industry: An Exercise in What Could Have Been," chapter 8 in *Resource Rents and Public Policy in Western Canada*, eds. T. Gunton and J. Richards (Halifax: The Institute for Research on Public Policy, 1987); Warnock, *Exploiting Saskatchewan's Potash*; and Burton, *Potash*.
10. C.R. Taylor and D.L. Moss, *The Fertilizer Oligopoly: The Case for Global Antitrust Enforcement* (Washington, DC: The American Antitrust Institute, 2013), 16-17; al Rawashdeh and Maxwell, "Analysing the World Potash Industry," 145; R. al Rawashdeh, E. Xavier-Oliveira and P. Maxwell, "The Potash Market and Its Future Prospects," *Resources Policy* 47 (2016): 155.
11. Scarcity rents are those earned when and if a producer can sell potash for revenues that exceed all of its economic costs (including a normal rate of profit), simply because of its ability to access higher quality and lower cost potash reserves than those of the highest cost producer. In a competitive market, the market price will equal the marginal or extra cost of the highest cost active producer. All other producers with lower costs will earn scarcity rents.
12. By market power, we mean the power to affect the market price. Such power typically allows a producer to earn revenues that exceed all of its economic costs. These monopoly rents may be earned in addition to any scarcity rents.
13. Section 92A of the 1982 amendments to the *Constitution Act, 1867*; see: <http://laws-lois.justice.gc.ca/eng/const/page-4.html#h-20>, accessed September 16, 2016.
14. Consumer surplus refers to the net benefits to buyers of obtaining a product for less than the maximum they would be willing and able to pay; producer surplus generally equals rents (pure economic profit); government surplus is the government's budgetary surplus. See: A.E. Boardman et al. "A Cost-Benefit Analysis of the Privatization of Canadian National Railway," *Canadian Public Policy*, 35:1 (2009): 71.
15. Conference Board of Canada, *Saskatchewan in the Spotlight*, 12.
16. Warnock, *Exploiting Saskatchewan's Potash*, 20.
17. Conference Board of Canada, *Saskatchewan in the Spotlight*, 21.

18. By dynamic efficiency we refer to the best rate of extraction of the resource over time; this can clearly affect the distribution of the resource rents over time and hence across generations.
19. Taylor and Moss, *The Fertilizer Oligopoly*, 16-33; al Rawashdeh and Maxwell, "Analysing the World Potash Industry," 144.
20. See, among others: L. De Alessi, "Implications of Property Rights for Government Investment Choices," *American Economic Review*, 59:1 (1969): 13-25; A.A. Alchian and H. Demsetz, "The Property Rights Paradigm," *Journal of Economic History* 33:1 (1973): 16-27; A.E. Boardman and A.R. Vining, "Ownership and Performance in Competitive Environments: A Comparison of the Performance of Private, Mixed and State-Owned Enterprises," *Journal of Law and Economics*, 32:1 (1989): 1-33; B. Villalonga, "Privatization and Efficiency: Differentiating Ownership Effects from Political, Organizational and Dynamic Effects," *Journal of Economic Behavior and Organization*, 42 (2000): 43-74.
21. See, for example: D.E. Sappington and J.E. Stiglitz, "Privatization, Information and Incentives," *Journal of Policy Analysis and Management* 6:4 (1987): 567-581; O. Hart, A. Shleifer and R.W. Vishny, "The Proper Scope of Government: Theory and Application to Prisons," *Quarterly Journal of Economics* 112:4 (1997): 1127-1161; D. Martimort, "An Agency Perspective on the Costs and Benefits of Privatization," *Journal of Regulatory Economics* 30:1 (2006): 5-44; A. Cavalieri and S. Scabrosetti, "Privatization and Efficiency: From Principals and Agents to Political Economy," *Journal of Economic Surveys* 22:4 (2008): 685-710.
22. J. Vickers, and G. Yarrow, "Economic Perspectives on Privatization," *Journal of Economic Perspectives* 5:2 (1991): 111-132; E. Sheshinski and L.F. López-Calva, "Privatization and its Benefits: Theory and Evidence," *CESifo Economic Studies* 49:3 (2003): 429-59.
23. J. Kornai, "The Soft Budget Constraint," *Kyklos* 39:1 (1986): 3-30; A. Shleifer and R.W. Vishny, "Politicians and Firms," *Quarterly Journal of Economics* 109:4 (1994): 995-1025; J.A., Robinson and R. Torvik, "A Political Economy of the Soft Budget Constraint," *European Economic Review* 53:7 (2009): 786-798.
24. Vickers and Yarrow, "Economic Perspectives on Privatization," 115; A.R. Vining and A.E. Boardman, "Ownership versus Competition: Efficiency in Public Enterprise," *Public Choice* 73:2 (1992): 205-239; J.Y. Lin, F. Cai and Z. Li, "Competition, Policy Burdens and State-Owned Enterprise Reform," *American Economic Review* 88:2 (1998): 422-427.
25. J. Haskel and A. Sanchis, "Privatization and X-Inefficiency: A Bargaining Approach," *Journal of Industrial Economics* 43:3 (1995): 301-321; M. Boycko and A. Shleifer, "A Theory of Privatisation," *The Economic Journal* 106:405 (1996): 309-319.
26. C.H. Knutson, A. Rygh and H. Hveem, "Does State Ownership Matter? Institutions' Effect on Foreign Direct Ownership Revisited," *Business and Politics* 13:1 (2011): Article 2.
27. Shleifer and Vishny, "Politicians and Firms;" Boycko and Shleifer, "A Theory of Privatisation;" P. Hartley and K.B. Medlock III, "A Model of the Operation and Development of a National Oil Company," *Energy Economics* 30:5 (2008): 2459-2485.
28. G. Corneo and R. Rob, "Working in Public and Private Firms," *Journal of Public Economics* 87:7/8 (2003): 1335-1352.
29. Vickers and Yarrow, "Economic Perspectives on Privatization," 117; H-L. Wu, "The Policy-Fit View of the Efficiency Effects of Privatization," *Journal of Policy Modeling* 28:3 (2006): 281-292; H. Tauchmann, H. Clausen and M. Oelmann, "Do Organizational Forms Matter? Innovation and Liberalization in the German Wastewater Sector," *Journal of Policy Modeling* 3:6 (2009): 863-876; Boubakri et al., "Privatization and Globalization: An Empirical Analysis," *Journal of Banking and Finance* 37:6 (2013): 1898-1914.
30. N. Bloom et al., "Management practices across firms and countries," *Academy of Management Perspectives* 20:1 (2012): 13-14.
31. See, for example: N. Boubakri and J.-C. Cosset, "The Financial and Operating Performance of Newly Privatized Firms: Evidence from Developing Countries," *Journal of Finance* 53:3 (1998): 1081-1110; W.L. Megginson and J.M. Netter, "From State to Market: A Survey of Empirical Studies on Privatization," *Journal of Economic Literature* 39:2 (2001): 403-521; A. Chong and F. López-De-Silanes, "Privatization in Latin America: What Does the

Evidence Say? *Journal of the Latin America and Caribbean Economic Association* 4:2 (2004): 37-94; J. D'Souza, W.L Megginson and R. Nash, "Effect of Institutional and Firm-Specific Characteristics on Post-Privatization Performance: Evidence from Developed Countries," *Journal of Corporate Finance* 11:5 (2005): 747-766; Wu, "The Policy-Fit View of the Efficiency Effects of Privatization"; I. Otchere, "Competitive and Value Effects of Bank Privatization in Developed Countries," *Journal of Banking and Finance* 33:12 (2009): 2373-2385; Y. Fang, I. Hasan and K. Marton, "Bank Efficiency in South-Eastern Europe: The Role of Ownership, Market Power and Institutional Development," *Economics of Transition* 19:3 (2011): 495-520.

32. J. Nellis, "The International Experience with Privatization: Its Rapid Rise, Partial Fall, and Uncertain Future," University of Calgary School of Public Policy Research Papers, 2012: 31.
33. Vining and Boardman, "Ownership versus Competition: Efficiency in Public Enterprise; A. Shleifer, "State versus Private Ownership," *Journal of Economic Perspectives* 12:4 (1998): 133-150; Megginson and Netter, "From State to Market: A Survey of Empirical Studies on Privatization"; S. Djankov and P. Murrell, "Enterprise Restructuring in Transition: A Quantitative Survey," *Journal of Economic Literature* 40:3 (2002): 739-92; Sheshinski and López-Calva, "Privatization and its Benefits: Theory and Evidence"; S. Estrin, J. Hanousek, E. Kočenda and J. Svejnar, "The Effects of Privatization and Ownership in Transition Economies," *Journal of Economic Literature* 47:3 (2009): 699-728.
34. For example: S. Ghosh, "How Did State-Owned Banks Respond to Privatization? Evidence from The Indian Experiment," *Annals of Public and Cooperative Economics* 81:3 (2010): 389-421.
35. B. Bortolotti, J. D'Souza, M. Fantini and W.L Megginson, "Privatization and The Sources of Performance Improvement in The Global Telecommunications Industry," *Telecommunication Policy* 26:5/6 (2002): 243-269; M.G. Pollitt, "The Role of Policy in Energy Transitions: Lessons from The Energy Liberalization Era," *Energy Policy* 50 (2012): 128-137.
36. Megginson and Netter, "From State to Market: A Survey of Empirical Studies on Privatization," 347.
37. Boardman et al. "A Cost-Benefit Analysis of the Privatization of Canadian National Railway."
38. A.E. Boardman, A.R. Vining and D. Weimer, "The Long-Run Effect of Privatization on Productivity in Canada," forthcoming in *Journal of Policy Modeling* (2017).
39. Conference Board of Canada, *Saskatchewan in the Spotlight*, 25; Burton, Potash, 143.
40. As of this writing, PCS and Agrium are planning a merger; McNish and McKinnon, "Canadian Fertilizer Giants Agrium and Potash Agree to Merge."
41. Villalonga, "Privatization and Efficiency: Differentiating Ownership Effects from Political, Organizational and Dynamic Effects."
42. J.M. González-Páramo and P.H. De Cos, "The Impact of Public Ownership and Competition on Productivity," *Kyklos* 58 (2005): 495-517.
43. J.D. Brown, J.S. Earle and A. Telegdy, "The Productivity Effects of Privatization: Longitudinal Estimates from Hungary, Romania, Russia and Ukraine," *Journal of Political Economy* 114:1 (2006): 61-99.
44. Boardman, Vining and Weimer, "The Long-Run Effect of Privatization on Productivity in Canada."
45. A. Curvo, and B. Villalonga, "Explaining the Variance in the Performance Effects of Privatization." *Academy of Management Review* 25:3 (2000): 581-590.
46. P. Ghemawat, "Building Strategy on the Experience Curve," *Harvard Business Review* 63:2: (1985): 143-149.
47. Conference Board of Canada, *Saskatchewan in the Spotlight*, 17-18; Burton, Potash, 114.
48. Flatters and Olewiler, "Dominant Government Firms in an Oligopolistic Industry: The Case of Saskatchewan Potash," 4; Richards, "The Saskatchewan Potash Industry," 124-129.
49. On partial privatization, see: A.R. Vining, A.E. Boardman and M.A. Moore, "The Theory and Evidence Pertaining to Local Government Mixed Enterprises," *Annals of Public and Cooperative Economics* 86:1 (2014): 53-86.
50. All price data was obtained from: https://ycharts.com/indicators/potassium_chloride_muriate_of_potash_spot_price, accessed August 30, 2016.

51. Authors' calculations.
52. Burton, Potash, 139-140.
53. Warnock, *Exploiting Saskatchewan's Potash*, 21.
54. FundingUniverse. "History of Potash Corporation of Saskatchewan Inc." August 26, 2016. Available online at: <http://www.fundinguniverse.com/companyhistories/potashcorporationofsaskatchewaninchistory/>.
55. A.E. Boardman, C. Laurin and A.R. Vining, "Privatization in Canada: Operating and Stock Price Performance with International Comparisons," *Canadian Journal of Administrative Sciences* 19:2 (2002): 150.
56. Warnock, *Exploiting Saskatchewan's Potash*, 20.
57. Conference Board of Canada, *Saskatchewan in the Spotlight*, 21.
58. al Rawashdeh and Maxwell, "Analysing the World Potash Industry," 150.
59. H. Hotelling, "The Economics of Exhaustible Resources," *The Journal of Political Economy* 39:2 (1931): 137-175.
60. J. Krautkraemer, "Non-Renewable Resource Scarcity," *Journal of Economic Literature* 36:4 (1998): 2066.
61. R. Younglai, "PCS-Agrium Deal Would Face Antitrust Hurdles," *Globe and Mail*, September 2, 2016.
62. al Rawashdeh and Maxwell, "Analysing the World Potash Industry," 151.
63. Flatters and Olewiler, "Dominant Government Firms in an Oligopolistic Industry: The Case of Saskatchewan Potash," 1.
64. D. Spiro, "Resource Prices and Planning Horizons," *Journal of Economic Dynamics and Control* 48 (2014): 159-175.
65. See, for example: T. Heaps and J. Helliwell, "The Taxation of Natural Resources," Chapter 8 in *Handbook of Public Economics*, Vol. I, ed. A.J. Auerbach and M. Feldstein, Elsevier Science Publishers B. V. (North-Holland), 1985; R. Broadway and F. Flatters, *The Taxation of Natural Resources: Principles and Policy Issues*, The World Bank: Policy Research Department, Working Paper Series, No. 1210, 1993; B.C. Land, "Resource Rent Taxation—Theory and Experience," Working paper presented to the IMF Conference on Taxing Natural Resources, September 2008, available online at: <http://www.imf.org/external/np/seminars/eng/2008/taxnatural/pdf/land.pdf>; R. Garnaut, "Principles and Practice of Resource Rent Taxation," *The Australian Economic Review* 43:4 (2010): 347-356; J. Mintz and D. Chen, "Capturing Economic Rents from Resources through Royalties and Taxes," University of Calgary School of Public Policy Research Papers, Volume 5, Issue 30, October 2012.
66. D. Chen and J. Mintz, "Fixing Saskatchewan's Potash Royalty Mess: A New Approach for Economic Efficiency and Simplicity," University of Calgary School of Public Policy Research Papers, Volume 6, Issue 7, February 2013.
67. Among these assumptions, it must be the case that the private and public sectors use the same discount rate and that there are no other uncorrected market failures. The discount rate reflects the (discounted) value that is placed on costs and revenues that occur in the future, relative to the present. If the public sector's (social) discount rate lies below the private sector's, then there is a market failure argument for slowing extraction and conserving the resource for future generations beyond what private actors would achieve. For more on whether the social discount rate should be set below private sector rates, see: M.A. Moore, A.E. Boardman and A.R. Vining, "More Appropriate Discounting: The Rate of Social Time Preference and the Value of the Social Discount Rate," *Journal of Benefit-Cost Analysis* 4:1 (2013): 1-16.
68. Chen and Mintz, "Fixing Saskatchewan's Potash Royalty Mess: A New Approach for Economic Efficiency and Simplicity."
69. Land, "Resource Rent Taxation—Theory and Experience," 12.
70. Mintz and Chen, "Capturing Economic Rents from Resources through Royalties and Taxes."
71. M.A. Moore, A.E. Boardman and A.R. Vining, "Risk in Public Sector Project Appraisal: It Mostly Does Not Matter!" Unpublished working paper, 2017.
72. For example, K+S and BHP Billiton are both developing new potash mines in Saskatchewan: Younglai, "PCS-Agrium Deal Would Face Antitrust Hurdles."

- [73.](#) Garnaut, "Principles and Practice of Resource Rent Taxation," 353.
- [74.](#) Of course, even when PCS was a SOE, the remaining 60% of the productive capacity of the province was in private hands and was subject to various taxes and royalties.
- [75.](#) Moore, Boardman and Vining, "More Appropriate Discounting: The Rate of Social Time Preference and the Value of the Social Discount Rate."
- [76.](#) Vining, Boardman and Moore, "The Theory and Evidence Pertaining to Local Government Mixed Enterprises."
- [77.](#) Burton, *Potash*, 194-195.
- [78.](#) Warnock, *Exploiting Saskatchewan's Potash*, 11.
- [79.](#) *Ibid*, 14.
- [80.](#) Richards, "The Saskatchewan Potash Industry," 127.
- [81.](#) Warnock, *Exploiting Saskatchewan's Potash*, 15.
- [82.](#) *Ibid*, 16.
- [83.](#) Chen and Mintz, "Fixing Saskatchewan's Potash Royalty Mess," 8-11.
- [84.](#) Broadway and Flatters, *The Taxation of Natural Resources*; Garnaut, "Principles and Practice of Resource Rent Taxation"; Chen and Mintz, "Fixing Saskatchewan's Potash Royalty Mess."
- [85.](#) Conference Board of Canada, *Saskatchewan in the Spotlight*, 8; al Rawashdeh and Maxwell, "Analysing the World Potash Industry," 151.
- [86.](#) Flatters and Olewiler, "The Case of Saskatchewan Potash," 3; al Rawashdeh and Maxwell, "Analysing the World Potash Industry," 145.
- [87.](#) Flatters and Olewiler, "The Case of Saskatchewan Potash," 5-6 and 9-10.
- [88.](#) Conference Board of Canada, *Saskatchewan in the Spotlight*, 14.
- [89.](#) Younglai, "PCS-Agrium Deal Would Face Antitrust Hurdles."
- [90.](#) McNish and McKinnon, "Canadian Fertilizer Giants Agrium and Potash Agree to Merge."
- [91.](#) *Ibid*.
- [92.](#) As mentioned before, Canadian consumption of potash represents a very small percentage of domestic output and so we ignore it in discussing the North American market.
- [93.](#) al Rawashdeh and Maxwell, "Analysing the World Potash Industry," 147.
- [94.](#) Taylor and Moss, *The Fertilizer Oligopoly*, 17.
- [95.](#) *Ibid*, 24-36.
- [96.](#) Flatters and Olewiler, "The Case of Saskatchewan Potash." Cournot behaviour means that the Saskatchewan producers acted independently to maximize their own profits by choosing their output rates, given the outputs they expected their competitors to produce. While each had some individual ability to affect price, they did not apparently try to collectively determine the market price.
- [97.](#) *Ibid*. The Stackleberg leader chooses its output level first, generally forcing its "follower" competitors to produce less. If the leader can commit to a larger output before its competitors choose their output rates, it can increase its market share and profits at their expense.
- [98.](#) Richards, "The Saskatchewan Potash Industry," 129-130; Burton, *Potash*, 112-113.

