

WORKING DOCUMENT N° 1 / RED SUR 2013

COMPARING THE IMPACTS OF MINERAL EXPLOITATION AND EXPORTS: CANADA AND DEVELOPING COUNTRIES

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The South American Network on Applied Economics (Red Sudamericana de Economía Aplicada / Red Sur), is a policy-oriented research network integrated by public and private universities and centers of knowledge production in the region. It conducts research in the areas of economic development, natural resources, inclusive growth, employment, integration, trade and value chains, productivity and innovation.

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Canada has depended substantially on natural resources throughout its history and has had a reasonably important though never dominant mining sector since the second quarter of the twentieth century. One reading of the Canadian story has the modest-sized mining industry playing a positive supportive role in overall development over more than a century. After climbing the manufacturing mountain with considerable success, and attaining the output structure of a modern rich economy, Canada reverted towards greater dependency on natural resources, especially mineral ones. The international record makes it clear that many countries have benefited greatly from mining and other natural resource exploitation and that many others have not—especially when employment and income distribution outcomes are taken into account. Analysis of what distinguishes these groups remains relevant to countries like Canada as well as to the resource-endowed developing countries. This document in particular aims to shed light on the impacts of mineral exploitation and exports for Canada with a focus on the lessons that could be useful for developing countries. It provides some background theory on measuring an industry's contribution to the economy, highlighting the importance of considering all the factors involved to make a meaningful estimate. It also goes over aspects of the politics of mining in Canada and the debates of 2013.

This is one of the papers that contributed to the debate at Red Sur - IDRC's workshop "The Future of Extractive Industries in Latin America and the Caribbean and the Role of Science, Technology and Innovation (STI)" held in Buenos Aires on September 21 & 22, 2016, which brought together regional and international experts and decision makers in different key areas related to the future opportunities and challenges for extractive industries development. The main aim of the workshop was to generate knowledge on how the Science, Technology and Innovation (STI) systems in LAC countries can help to face those opportunities and challenges in the light of the experience of resources rich developed countries and the current situation and prospects of extractive industries in the region.

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1. Introduction: some background thinking on motors of economic growth

The last 20 years or so has seen a heightening awareness among students of economic development that a dependence on mineral exports can bring a range of negative effects along with the foreign exchange which has traditionally been seen as a key input to a country's fast growth. The well-known evidence on the frequency with which mineral exploitation brings environmental damage and/or human rights abuses is thus now accompanied by the less-familiar evidence that it may not bring as much economic growth as expected and that its effects on income distribution are prone to be negative. Part of this increasing understanding of these purely economic effects has been the identification of the Dutch Disease and the broader "Natural Resource Curse" in both developing and industrial countries.¹

This relatively recent rethinking of the role of minerals in economic development comes against a background of several earlier and sometimes strongly contrasting bodies of thought relating, respectively, to the history of now developed countries like Canada, the USA, and Australia and to developing countries (often colonies) where mineral exploitation was carried out by foreign firms (in the case of colonies usually those of the imperial power in question). In the former literature mining, together with other staples, was often seen (e.g. W. A. Mackintosh) as a stepping stone to growth, development and eventual industrialization; on the other hand the most famous contributor to this theory, Harold Innis, saw a tendency for Canada to become permanently locked into dependency as a resource hinterland (Easterbrook and Watkins, 1967). There was no debate that Canada grew up with a "dependence" on exportable natural resource products; the issue was whether dependence on these "staples" would lock it into this pattern of international trade and if so, what the implications of that fact might be. The perspective of the dependency-oriented school of economic historians in Canada (e.g. Melvin Watkins) had much in common with the famous dependency school thinkers (structuralists) of Latin America like Furtado (1971), Cardoso and Faletto (1979) and Sunkel (1973).

In this body of staples/dependency thinking built around the experiences of the new world countries like Canada, Australia, Argentina and the United States, all of them among the ten or so highest income countries in the early 20th century, both the similarities and the differences between mining and other primary commodities came in for some attention. Much of the special interest, whether in mining or in natural resource industries as a whole, involved those countries which relied disproportionately on these sectors. The United States was by the 19th and early 20th centuries a relatively balanced economy with a low ratio of trade to GDP, whereas the other three all had much higher ratios, so greater interest attaches to these three and their possible lessons for today's developing countries.

A prominent concept related to this literature has been the "leading industry" which could act as a "motor of growth" to pull the rest of the economy along with it. It is important to understand for which activities and under what circumstances sectoral growth does

¹. A seminal work on the Dutch disease is Corden and Neary (1982). On what became known as the natural resource curse, see Sachs and Warner (2001), Auty (2001) and Davis (1995).

have the potential to substantially raise GNP as a whole. Some industries may grow a lot themselves but not, in the process, raise GNP much nor hence raise GNP per capita much either. Such sectoral growth is of course much less desirable than that which raises GNP per capita quickly through positive effects on other parts of the economy.

Many industries have received the implicit accolade of the terms “motor of growth” or “leading industry”, including mining and other natural resources, manufacturing, more recently high tech service industries, electricity, the automobile, and construction. What have the users of this term meant by it, beyond the general idea that the industry in question can somehow contribute a lot to growth? We return to this issue in the next section, but several distinctions can be made here, in terms of the sense in which the industry contributes strongly to growth. Possible situations include:

- i) exploitation of a new resource (perhaps recently discovered) which can provide higher productivity of mobile resources than are attained in the current uses of those resources; this can boost growth even if there are no other positive mechanisms at work. It includes most obviously the case of new mineral finds, but also expansion onto agricultural lands, etc.
- ii) creation of a new product that is so attractive to buyers that the industry can expand a lot while still achieving higher total factor productivity (TFP) than is possible in other industries, e.g. the automobile.
- iii) growth of an industry that raises productivity in other industries through a technological transfer, sometimes as well as being a strong consumer good in and of itself (e.g. electricity);
- iv) growth of an industry that is big enough and can achieve enough internal dynamism, (high investment rates and/or high rates of productivity growth) to provide a boost to the economy;
- v) growth of an industry with atypically large positive Hirschman linkage effects;
- vi) growth of an industry with atypically strong Keynesian demand effects on other industry. Unlike all other categories of “motors of growth” this function can be performed by any industry that can grow fast under conditions of low aggregate demand.

One early body of analysis studied the “enclave economy” resulting from foreign investment in a natural resource industry geographically removed from the host country’s main centres of economic activity and that as a result had few economic links to that country’s economy, including a dearth of fiscal benefits in royalties, taxes, etc. This was a common pattern in the days of imperial power. This literature explained and decried how such foreign investment in a natural resource industry could essentially leave the economy of the host country if not untouched at least unbenefitted (Beckford, 1982). The economic isolation of such activities earned them the sobriquet “enclave”; some decades later analysts identified a mechanism (the natural resource curse) whereby such investment could at worst bring not a zero but a negative overall impact to the host country. Avoiding such outcomes is one of today’s challenges in many developing countries.

Thinking up to the 1960s or so thus covered the range from the enclave idea of pure exploitation of natural resources, in the sense that there was simply no significant impact –positive or negative– on the local economy, through the dependency view of some scholars in both Canada and Latin America, to the more positive strand of staples theory which saw natural resource dependency as a stepping stone to growth and development.

The Dutch disease and Natural Resource Curse theories mainly reflected the appearance of outcomes.

The two main conclusions of the modern natural resource curse literature are (i) that many things can go wrong in mineral exporting countries (or countries exporting other products with similar characteristics), hence the poorer than expected average performance of such countries (identified for example by Sachs and Warner, 2001), whose probing has been the central theme of the literature on this theme; and (ii) that there is nonetheless a wide range of experiences among countries falling into this category, with some doing quite well even as others do quite badly. This latter fact sets the stage for the key policy issue in this area: what are the differences –of setting or policy, or both– between the strong and the weak performers? It also provides the context for a consideration of how Canada's experience as a major mining country (in particular over the last decade) compares and contrasts to that of both successful and unsuccessful mineral exporters in the developing world.

2. What matters about the industry and the setting: some background theory on measuring an industry's contribution to the economy.

The basic question that must be asked about any industry (call it industry "A") is "how different the economy would be in its absence or if it were smaller or bigger?" A useful framework/set of categories with which to approach the question involves four perspectives:

- vii) static economics, whose focus is the efficiency of the allocation of a fixed amount of resources;
- viii) dynamic economics, with focus on the sources of economic growth, principal among them investment and technological advance, and on possible routes of path dependency;
- ix) what we may broadly refer to as "externalities" or spillover effects of the presence of industry A on the rest of the economy, including direct impacts on welfare of individuals (as in the case of pollution resulting from industrial activity); and
- x) public sector-private sector interactions; in particular, how much of the income generated in industry A reaches the public coffers and how it is used, as well as transfers from the state to the industry.

All of these aspects of an industry's effects on the national economy must be taken into account in order to measure its net contribution.² With respect to each of them, the time dimension may be important and hence has to be part of the analysis. It is sometimes necessary to distinguish national income or product (GNI) from domestic income or product (GDP) since in the case of mining in particular there is a considerable amount of foreign direct investment (FDI) which generates a return flow of profits to the investing country; these form part of the host country's GDP but not of its GNP or GNI; the main variable used to measure aggregate output or income performance should thus be national income or product rather than domestic income or product. In some situations the difference is insignificant whereas in others it matters. Finally, since economic units, whether sub national, national or supranational interact with each other in a wide variety of ways, it is necessary to take note of the fact that a given economy's performance affects not only the people who reside there (or are citizens) but people who live elsewhere as well. On the purely economic front, a fast growing economy typically pulls some other countries or regions along with it, acting as a leader. On the environmental front, though certain types of damage (local air pollution leading to health problems) may have fairly localized effects, global warming is now a major international public "bad" whose impacts must be taken account of.

Analysis at the static level is the simplest, but even abstracting from dynamic effects, externalities, and public-private interactions, it is not at all straightforward to sort

2. For a discussion see Barro and Sala-i-Martin (2004).

out an industry's likely contribution to aggregate output (or to employment or income distribution). One handy starting point is the actual market value of its output (or the employment it creates, the labour income earned in it, etc.). One can then ask whether there are general reasons to believe that such market-based figures underestimate or overestimate the industry's net contribution to the economy. The answer is a resounding "it depends". Still, while no generalizations are possible, theory does tell us what to look at in order to answer the question.

Under the common assumptions –useful to get the analysis started– of full employment of resources, pure and perfect competition in all industries, total factor productivity (TFP) the same for all firms in a given industry,³ no externalities (positive or negative) with other parts of the economy and no public sector, the (static) theory of comparative advantage (CA) tells us that industries producing tradables (i.e. exportables and importables) compete among each other and when one grows (e.g. due to a resource discovery or an increase in productivity) others shrink. When the economy operates closely enough to the assumptions of perfect competition across the board on which this first-level theory is based, it also tells us that in terms of GNP the gains will exceed the losses. When the economy is in equilibrium, all units of a given factor of production have the same marginal productivity in whatever industry they are used and a very small increase (or decrease) in the output of industry A will have only a marginal impact on GNP, since the inputs involved would have almost the same productivity elsewhere as in A. But for non-marginal shifts of resources this generally ceases to be the case and theory helps to identify what determines the degree of output decline elsewhere.

An industry's importance to an economy depends on the combination of how easy it is to produce other things with the same inputs (substitutability in production) and how easy it is for consumers (or more generally, buyers) to substitute other goods and services in place of its output (substitutability in consumption or absorption). Thus at one extreme, when substitutability is high on both the production and the use sides, the industry's presence makes little difference to GNP or to societal welfare, since resources shifted from other uses to industry A are only minimally more productive there than elsewhere.⁴ When it is low on either side, the industry's presence makes a difference and when it is low on both sides, that difference is at its largest. With low substitutabilities the marginal rate of transformation between this good and others is very sensitive to the relative quantities produced, as is the marginal rate of substitution in use. An interesting in-between scenario is that in which, although good A can be perfectly substituted by other goods in consumption or use, the inputs to its production are of no use elsewhere and would thus in its absence not have been employed at all, the actual output and employment of industry A do measure accurately its net contribution to the economy. Since some resources are industry-specific even in the longer run, as with natural resources (an oil well) or some very specific types of labour, cases that approach this scenario are in principle possible. At the high end of the spectrum in terms of the true value of this industry, its net contribution actually exceeds its current market share of GNP. This occurs when there is low substitutability on the demand side

3. In fact, in equilibrium this condition follows from the previous two if perfect competition is seen as implying that each firm has full knowledge of technological options.

4. These levels of substitutability depend, among other things, on how narrowly or broadly an industry is defined. Thus they tend to be high on both production and use sides when the good is defined quite narrowly (e.g. a single type of vegetable) and lower when it is defined broadly (e.g. all vegetables). They also depend on the time allowed for adjustment; thus rates of substitution are lower in the short run and higher in the longer run.

as well as on the supply side for a good. Low substitutability in demand means the good is highly complementary in consumption to other goods/services.⁵ This sort of case does support the view that share of GNP measured at existing market prices may understate the importance of the industry.⁶

Marginal rates of transformation in any economy are set by technical factors on the production side while marginal rates of substitution are set by the demand side, ultimately by substitution in consumption. The logic of this theoretical framework is most appropriate to the world economy; when a smaller unit is under consideration the phenomenon of international or interregional trade must be allowed for. In the present context the natural unit is the country, since policy is made at that level. For most tradable goods and services, the (relative) price is set at the world level and only a few countries that have a considerable share of world supply or demand have a significant influence on it. With (at the limit) fixed world prices, the domestic marginal rate of substitution in use among tradable items does not matter since the country can adjust its level of consumption of each item through international trade. The marginal rate of transformation does matter and if it is zero the full market value of the industry's output is, indeed, its net contribution to GNP.⁷ The higher the degree of substitutability in production the lower this net contribution, with its minimum value being zero. For countries, therefore, the implications of the degree of substitutability or complementarity in use are affected by the degree of openness—the ability to trade with other countries. It is important to note that a key matter is how much smaller or larger the industry might be since these marginal rates of substitutability change with the degree of resource transfer.

For large countries or in the presence of non-tradable goods and services, the marginal rate of substitution in use between good A and other items of consumption becomes relevant, i.e. the loss from industry A's absence or smaller size depends also on the substitutability in use between good A and the alternative goods and services that can be produced with the same resources.⁸ The sensitivity of relative prices to changes in relative quantities depends on the openness of an economy (for traded items) and on the structure of local preferences (for non-traded ones).

With the assumptions of free trade, no non-tradables, full employment, pure competition and no externalities, an industry's share of output or employment gives an upward biased estimate (or better a ceiling) on its true contribution to the economy. In the absence of any one of these assumptions things become cloudier; that contribution now depends, among other things, on the degree of resource underutilization and whether industry A draws mainly on otherwise underutilized resources or not; the presence of externalities and whether they are positive or negative, and market structure. The latter is perhaps the most complicated to deal with. Because industries that exercise market power (and hence charge prices above

5. At the limit, where good A is perfectly complementary in use with the package of all other goods and services, without A there would be no consumption at all, i.e. the existence of the industry "accounts for" all of GNP (as do other industries as well).

6. It leaves us with the somewhat confusing fact that each industry's absence could lower GNP by more than its current share of that GNP, so the sum of the absences of the various industries would be a multiple of the GNP.

7. This is the so-called "vent for surplus" case, where the gains from trade are greatest because a resource cannot be put to some other use and the product cannot be absorbed usefully in the country (Myint, 1958).

8. When relative prices change due to a change in international trade or any other kind of change, the best way to measure national economic welfare also becomes more complicated.

their marginal costs) are normally undersized relative to the economically efficient level, when they expand above their privately profit maximizing size GNP rises (other things equal), as long as the resources they draw on to expand come from industries that are more competitive than they. Implementing this bit of theory is not easy unless the flow of resources is fairly clear and the differences in degree of competitiveness are rather marked.

When the assumption of perfect competition is dropped, such that there can be productivity differences across firms and industries, another possible effect comes into play: total factor productivity may differ between industry A and the sectors from which it draws factors (if it is expanding) or to which it loses factors (if it is shrinking). If it is an industry with above average TFP, its expansion will automatically raise total output by the difference in that productivity level. Thus if total factor productivity were 50% higher in Canadian mining as in the sectors from which it draws factors, and it accounted for 10% of Canadian GDP, this static allocation effect would add about 3.3% to GDP (over whatever period the resource reallocation occurred).⁹

The role of dynamics

The second potential effect from the presence and size of a given industry involves the dynamic sources of growth, and it is much harder to analyze. That impact depends on how the industry affects aggregate savings, investment, and productivity change (total factor productivity growth). If the funds invested in its expansion would not in its absence have been used elsewhere (e.g. because the savings financing that investment would then not have occurred at all) then the industry should be credited with an addition to the total capital stock and also with the resulting addition to aggregate output. Similarly, an industry whose productivity improvement is faster than elsewhere and/or spills over to other industries makes a dynamic contribution in this way.¹⁰ Because the character of their effects is lasting, dynamic differences across industries often matter more than static ones. But because of measurement difficulties such links are not often analyzed in depth and hence often remain a matter of speculation.

Externalities constitute the third broad category of factors that determine an industry's economic contribution. For purposes of simplification these may be taken to include Keynesian multiplier effects and Hirschman linkage effects (regardless of exactly how these are defined) together with all other spillover effects, including positive technological spillover and environmental damages or benefits. As so defined, this category of effects involves how the economy as a whole functions, in particular how complete is the utilization of resources; Keynesian multiplier effects, for example, depend on some degree of resource underutilization for macroeconomic (demand) reasons.

9. Sudden removal of an industry would lead to a greater loss since only when the resources were satisfactorily reallocated would that loss reach its minimum possible level. Similarly, when a new industry arrives on the scene it takes some time for resources to be productively reallocated to it.

10. If an industry's TFP either begins higher or grows faster than that of other industries, its optimal size will be larger, *ceteris paribus*, and its growth will contribute out of proportion to its initial size. When industry A has higher TFP than other industries, a shift of resources to it from other industries will raise GDP. This income increase can be thought of as part of static reallocation. On the other hand, when its TFP grows faster than that of other industries for internal reasons, this is better thought of as a dynamic contribution.

Public-Private transfers (taxes, subsidies, etc.)

The public sector is a major actor in the process of growth in most countries (through investment in infrastructure, education, etc). Some industries have a net fiscal cost, others provide a net fiscal gain. The impact of the industry then depends also on how those additional fiscal resources (in case of a net fiscal gain) are used or how the funds drawn from the state would have been used had they not come to this industry. Because the mining sector often generates atypically high profit rates, it usually has the potential to provide a net fiscal benefit.

Another way to categorize the determinants of an industry's net impact on the economy distinguishes (i) characteristics of the industry itself; (ii) the structure of the rest of the economy and the ways the two interact; (iii) the policies pursued by government that affect either (i) or (ii). The second determinant involves how the setting for mineral resource exploitation has changed over time. For example, commodity price trends are likely to have an effect on the payoff to a given natural resource industry. The lengthy downward secular trend for commodities as a whole (e.g. Cashin and McDermott, 2002) would suggest a decreasingly attractive economic opportunities, though if that trend were the result of faster technological change this would not necessarily be true. In the case of Canada, Keay (2007:18) argues that technological advance (measured by total factor productivity) has been faster in the resource sector than elsewhere, though the main point of comparison (since it looms large in an economy) is services, and there are continuing questions as to the accuracy of measurement of technological change in many of these. Given the high and raising volatility of commodities prices and the many increases over the last decade, there is also the possibility that the long run downward trend is in process of being reversed, at least for a good number of commodities.¹¹

Independent of all of the above, it is important to remember that the issue of resource exploitation is seldom best framed as a “do or do not” question but rather as a matter of degree. A country with an extremely rich and accessible mineral resource is likely to benefit even if other countries with less rich and easily exploitable endowments of the same resource do not; and a country with good institutions to promote socially beneficial mining is more likely to benefit than is a country without that base. So the question of interest is, normally: “How much benefit can a country achieve through each level of resource extraction and what is the optimal level?”

2.1 Categorizing types of empirical studies of the impact of a specific industry

Empirical studies of the role or importance of a given industry or sector may be categorized according to how many of the above theoretically relevant features of that industry are successfully taken into account; some are usually dealt with, others almost never. The focus of analysis reflects the specific interests of the analyst.

11. Although this is not the point of their paper, data presented by Calvo-Gonzalez *et al.* (2010:17) show a preponderance of upward breaks over 2002-2008.

At a first level (the simplest) are either purely descriptive studies (focusing only on the industry's output,¹² employment, etc.) and those that also include a look at these same variables for "linked" industries; neither involves analysis of the types described above. Depending on the setting, they may yield very upward biased estimates of the industry's true contribution, though under other settings they may be downward biased. In any case they provide only one of the pieces of evidence needed to make a meaningful estimate. Most of the studies that identify linkages (e.g., through an input-output table) do not address the question of whether or how much these linkages may matter to GNP or to growth and whether (the operative question) they are greater or less than the linkages that characterize the alternative sectors that would be larger if this one were smaller. These difficult tasks are sometimes not undertaken simply because the analyst does not realize that it is necessary to nail down the relevance of the linkages in question.

Other estimates deserve the term "analytical" because they do attempt to take account of the real world complexities identified above, including the estimation of positive linkage effects as opposed to simply assuming that they equal the value of output of the linked industries. Such studies are relatively few and often difficult to compare with each other since many consider only one or a couple of the variables and mechanisms needing attention if an overall conclusion is to be reached about the industry's contribution to the economy. Some, of course, have more modest objectives; many, for example, address only the environmental impacts of an industry; they usually compare the value of the externalities to the industry's value added or its gross output rather than, say, its net static contribution to GNI. In short, studies vary greatly in terms both of their focus and of their completeness.

Approximating reality through an analytical understanding of the mechanisms discussed above and a detailed microeconomic knowledge of the parameters (substitutability in production, substitutability in demand or absorption, and the other relevant aspects of the insertion of the industry into the economy) on which a model can be built is hard given the inherent complexity of the economy and the daunting information challenges. This underscores the importance of having alternative methodological options; these essentially involve analysis of the *ex post* record through econometric tests of one sort or another. For example, otherwise similar countries with and without industry A may be compared for performance, or over-time analysis within a country may test for causal links between the growth of industry A and that of the economy as a whole. Most of the empirical literature on the Natural Resource Curse is econometric in character, involving both cross country work (e.g. Sachs and Warner, 2001) or country case analysis (e.g. Sala-i-Martin and Subramanian, 2003). None of these econometric approaches are easy to implement either, so the safest way to draw conclusions is to base them on as many different sources of evidence as possible.

The presence of externalities naturally complicates the measurement of the economic contribution of any industry. Externalities like linkage effects make it more difficult to use microeconomic analysis to get good estimates, and thus put a premium on being able also to undertake econometric analysis. In the case of environmental externalities

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12. Although in economics the term "output" applied to an industry refers to that industry's value added, this concept is sometimes confused with gross value of output or sales. This latter, larger figure is not relevant to the discussion here.

like pollution, whose presence means that standard GNP figures are mismeasured, there is the additional problem of how to deal with that mismeasurement. The best way is to use what are often referred to as “green national accounts”, which at best take account of two types of mismeasurement: the depletion of natural resources (which should be treated as depletion of fixed capital, a wastage of a resource), and positive and negative externalities. Both of these problems plague assessments of mining’s contribution since both are typically present: discoveries and/or depletion always, and externalities, usually. Canada, unfortunately, does not have official green national accounts.

Employment and income inequality

Broadly speaking, the same sorts of methodological complexities that must be confronted in asking how much difference the presence and dimensions of an industry make to GNP arise also in estimating its effects on employment and inequality. To a large extent the analysis overlaps. Thus, the parallel to the simple neoclassical conditions noted above (perfect competition, etc.) under which the resource reallocation effects on GNP of a slight expansion of industry A are minimal would be the situation in which the demand for each type of labour in industry A bears the same relation to other factor inputs as in the industries whose size adjusts downward in response to A’s expansion. If industry A has a greater demand for labour per unit of output than those other industries, the total demand for labour will rise, wages will rise and the distribution of income between labour and capital will improve. How much will depend on the elasticity of supply of the various types of labour whose demand is affected, as will overall income distribution.

Under more realistic assumptions than those just cited, an industry’s effects on employment and inequality can, as with its effect on GNP, reflect a wide range of causal mechanisms. For example the growth of industry A may have a positive spillover effect through the industries from which it gets inputs if there is underutilized labour in those input industries (or labour that could costless be pulled into them). Expansion of industry A can raise total labour demand in an economy under either a condition of generalized Keynesian unemployment or one of regional unemployment. Sometimes, also, employment may be raised temporarily as the firms of the expanding industry create new jobs but the industries that shrink hang on for some time (e.g. while their capital wears out, or while owners recognize that the venture cannot be sustained in the longer run). For this and other reasons, the equilibrium level of employment is also likely to be higher when an economy is growing fast. It is necessary to model the labour market in some detail in order to know how an industry’s expansion affects employment and wages.

3. Mining and its History in Canada

3.1 What is special about mining¹³?

Mining is a notably volatile activity. Most mining enterprises are therefore by their nature relatively speculative, in two different senses. The first relates to discovery of an exploitable mine; during the exploration stage the range of possible returns is unusually wide. In economic terms (as opposed, sometimes, to accounting or tax terms), the profits in any such speculative venture are made when the present value of the future benefit (profit) stream rises, as when a find discovery is made (if there is a market for the venture, this is reflected in the fact that its market value rises quickly). The future profit stream may go on for any length of time – long or short–, but the key phase is that during which the present value rises quickly. Mining ventures often share with other speculative activities that the potential private benefits are large and accrue during a relatively short period (unlike farming or manufacturing), in which case the politics favour the resource exploiter since those representing potential losers from the activity may be caught off guard and may have difficulty organizing their opposition; often there are many of them but just a few of the investors who, by moving fast, can get what they want before resistance reaches a high level.

The second factor that makes mining speculative involves the over-time volatility of the price of any given product;¹⁴ this is a result of the first aspect of uncertainty. A big find culminates a successful episode of speculation for the developer, but pushes down the price of the product for those already in production. The two features of the sector, taken together, imply a good deal of uncertainty about future profit streams. A third feature is added in the case of those products where the nature of the commodity lends itself to considerable speculation in commodities futures. There is considerable stockpiling of some mineral products, which creates a setting for speculative behavior, especially in the case of items like gold where much of the use is as a store of value *per se*. The sector's volatility, from whatever combination of these three factors, often spills over to the economy as a whole, through a variety of mechanisms.

Note that mineral-export dependency is a matter of degree, raising the question of whether there are threshold levels of dependence that matter to the outcomes. Another relevant distinction involves the probable duration of mineral dependence: for how long into the future can the mineral base be counted on to fuel the economy? For a country like Saudi Arabia the answer is “indefinitely”, while for many other countries proven resources will only perform that function for a decade or so. A major focus of the Natural Resource Curse literature involves countries losing alternative sources of comparative advantage (CA) as these are squeezed out during the period of mineral dominance and are then not available when it runs out, and/or alternative CAs are not developed in anticipation of that exhaustion.

13. Mining here generally refers to extraction of natural resources from the soil. It thus encompasses much of the energy sector but not the renewable forms of energy.

14. See, for example, Calvo-Gonzalez *et al.* (2010).

3.2 Canada, a mining country

There is no doubt that Canada has a strong mining industry, from experience in risk-taking ventures to a financial system able to provide strong support to the sector (Brean, 2001) including venture capital, legal services, geologists, etc. The strong “infrastructure” for mining has been the result of long experience with the industry. It now manifests itself, among other ways, in a considerable presence abroad, in such activities as gold, oil, etc. Over 60 percent of world mining corporations are registered on the Toronto stock exchange and industry CEOs and chairmen are among the important players in Canadian foreign policy.

Much mining activity is found in the hinterland (usually towards the north). There are environmental and other advantages to such a pattern. Although conflicts with aboriginal groups have been fairly frequent and are currently high profile, they have not taken on the violence of those in many developing countries. Competition for use of the land with commercial agriculture or with forestry is unusual; remoteness raises some costs but lowers the frequency of such conflicts. Workers migrate into mining areas and establish communities which may have relatively long lives or rather short ones. When mines close or employment shrinks markedly, communities do suffer. Elliott Lake in Northern Ontario has tried, since the collapse of uranium mining there, to recreate itself as a setting to which elderly people might retire, attracted by the low price of housing, the natural setting and the shared experience with others. The modest success of this venture is reflected in the town's population decline from around 25,000 people to around 11,000, with the history of high levels of cancer presumably not helping the effort. Sudbury has long been one of Canada's main mining cities but the producers are currently scaling employment down rapidly, leading to high unemployment and the other ills of such settings. Outward migration takes time since the remoteness cuts current residents off from familiarity with other places to which they might go, and their lost housing equity locks many of them into their local situation.

3.3 The economics of mining, other natural resources and manufacturing in twentieth century Canada: descriptive history and debates

As a large country with relatively low population, Canada has always been a candidate to produce and export natural resource products. Though playing a larger role than they would in less resource-endowed countries, most of the resource sectors have gradually lost economic weight over time. Agriculture, forestry, hunting and fishing accounted for nearly 20% of GDP in 1926 but by 2005 for under 2%, though their share of merchandise exports remained significant at about 16%. For the so-called “natural resource” industries defined as including the energy sector (extraction of coal, oil and petroleum and production of allied products; fishing, forestry and mining and products (e.g. fabricated metals, thus excluding agriculture but including processing of the items extracted) the contributions to employment fell from about 15% in 1947 to a little over 5% in 2005; to the capital

stock from about 20% and a later high of around 25% to about 15% in 2005, and for value added from around 20% to about 12% (Keay, 2008:32).

The capital labour ratio in the natural resource sector rose from about 1.33 times the economy-wide average in 1947 to about 2.5 times that average in 2005, while its TFP rose from 1.2 to around 1.4 (Keay, 2008:33) and relative labour productivity from about 1.4 to about 2.5 times the economy average. Over the recent period 1999-2006 the sector's profits as a share of total economy-wide profits have fluctuated a lot but without upward trend, usually in the range 20-25% (Cross, 2008, 3.3). This share held about constant during most of the last decade as steep losses in forestry offset a doubling of profits in the energy and mining sectors. Rapid appreciation of the currency also limited profits, since most products are priced in US dollars. The profit surge in energy/mining has brought additional foreign and domestic investment into metals and energy stocks, which accounted as of 2008 for 40-50% of value of shares traded (Cross, 2008, 3.4). The share of the resource sector in business investment fell from 40% in 1991 to a low of 30% in 1999, before climbing to around 45% in 2006-7 (Cross, 2008, 3.6).

The exception to the general pattern of relative decline of the natural resource industries over time has thus been mining, and in particular the energy sector (oil, gas, coal). During the early twentieth century, mining accounted typically for 3-6% of current price GNP (Table 1) but a considerably higher share of exports (Table 2). Output share rose back to 5% by 2002, then doubled to 10% by 2011. Thus the last 10 years has witnessed a dramatically rapid expansion of the weight of this sector (albeit due to rising prices), one which has no precedent in Canadian economic history but which makes this recent experience strikingly similar to that of many developing countries that have experienced sudden commodity booms.

Table #1. Sectoral composition of Gross National Product at factor cost, 1926-2011 (Percentages in current prices).

Year	Agriculture, hunting and fishing	Forestry	Mining	Manufacturing	Public sector	Finance	Other
1926	18.07	1.34	3.16	21.68	3.36	10.03	36.58
1940	11.41	1.64	5.98	26.70	7.29	8.94	38.04
1950	10.43	2.14	3.97	28.64	4.92	8.23	41.67
1960	5.40	1.25	4.43	26.06	7.24	10.46	45.16
1970	3.04	0.72	3.55	21.71	6.45	9.92	
1976	3.24	0.68	3.75	18.89	7.07	10.87	
1990	2.86 ^a		4.89	16.94			
2000	2.28 ^a			19.22			
2002	2.18 ^a		5.00	17.10	5.75	18.99	
2005	1.84 ^a		8.78	14.95			
2011	1.74 ^a		10.00	10.90		20.96 ^b	

a) includes forestry.

b) assumes no change in relative price since 2002.

Sources: For years up to 1960, Urquhart and Buckley (1965, pp. 178-9, p. 185). For later years, United Nations Statistics Division-National Accounts (on line).

**Table #2. Natural resources in Canada's export history
(Percent of total exports, current prices).
Panel A–1869-1960**

	Agricultural Products	Animal Products	Wood and products	Metals & products	Other
1869	21.9	18.3	35.0	4.2	20.6
1890	18.9	37.6	30.0	6.6	6.9
1910	35.0	23.8	19.1	16.7	5.4
1929	47.4	11.6	21.2	17.0	2.8
	46.7		25.4	14.9	13.0
1940	31.4		29.5	30.2	8.9
1950	31.8		35.7	26.7	5.8
1960	21.9		30.5	41.3	6.3

Notes: First four years, declared values, 1929 (second row and on, adjusted values).
Source: Urquhart and Buckley (1965, pp. 178-9, p. 185).

Panel B- 1971-2010a

Year	Agric. and Fishing	Forestry	Energy	Industrial goods	Machinery and Equipment	Auto	Consumer goods	Other
1971	13.45	16.65	7.29	26.18	11.08	23.41	1.58	0.36
1980	12.22	16.41	14.35	27.55	14.41	14.54	1.71	1.20
1990	9.41	14.38	9.87	22.72	20.41	24.53	2.36	3.57
2000	6.96	10.68	13.31	17.00	27.48	24.44	3.80	3.43
2005	7.13	8.64	20.60	19.96	22.04	20.86	4.06	3.20
2010	9.52	5.63	23.42	24.87	19.61	14.64	4.23	1.19

Notes: (i) Exports include re-exports.

(ii) Each of forestry, energy and industrial goods includes some items with a degree of fabrication, e.g. paper. As a result the numbers overstate the share of primary commodity exports that have undergone no processing. On the other hand, the manufactured export categories like auto include a relatively high use of imported inputs, and hence tend to overstate that category's share of Canadian value added in exports.

Source: Statistics Canada, Canadian Economic Observer: Historical Statistical Supplement: Table 4.2-1.

The roles of mining and of manufacturing in Canada's longer run economic performance have played out against a background of a downward secular trend in the country's growth rate from its peak 4-5% over 1940-1970 to around 3% by 1980-2000 and just 2% since 2000 (2.46 prior to the crisis beginning in 2008).¹⁵ The fast growth period 1940-1980 mainly coincides, whether coincidentally or causally, with the period during which the (current price) share of manufacturing in GDP was highest. This share fluctuated around 20% through the early decades of the twentieth century, then leapt quickly to its historic high of almost 30% around the end of WWII, remained above 25% until the mid-1960s, thereafter

15. Growth rate data from World Bank databank, online.

dropped precipitously until leveling off (albeit with marked fluctuations) over the 1980s and 1990s (Baldwin and Macdonald, 2009:17). The long run decline in manufacturing's share of (current price) GDP does not *per se* imply deindustrialization in the sense of decreasing sectoral output since GDP has of course been rising, but also because the relative price of manufactures has been falling, so output growth has been faster than the sector's' income growth. Baldwin and Macdonald (2009:8) note that between 1961 and 2005 the full sectoral decline was due to price effects, with volume of output growing at essentially the same pace as GDP; over this period manufacturing prices rose at 3.5% per year, those of services at 4% and those of commodities at 4.5%. Manufacturing was the major source of measured productivity growth in the Canadian economy. Over this period its decline in share of current price GDP was similar to that of the other high income countries (Baldwin and Macdonald, 2009:17) though somewhat less marked than the average for those countries, especially over about 1880-2000). The two main factors are the general downward trend in the share of manufacturing value added relative to services in developed countries (a matter of changes in the composition of demand) and the rapid entry of low wage countries as producers of manufactured goods over recent decades, such that the share of all manufacturing production in these industrial countries has fallen. Although some observers have blamed the rise of natural resource exports for the decline of manufacturing in current price value added and in employment, it is unlikely that this could be a factor as important as the previous two, although over short periods it might play a significant role.

Thus, although Canada has always been seen as a resource dependent country, manufacturing did become the most important single sector of the economy, reaching nearly 30% of GDP around the middle of the twentieth century.¹⁶ And, as in many other countries, the period when manufacturing was most prominent was also the country's fastest growth period, during which it narrowed the per capita income gap vis-à-vis the US. The growth burst over 1950-1975 (especially 1960-75) saw Canada's relative per capita income rise from 76.3% in 1950 to 77.3% in 1960 and to 87.9% by 1975, after which it slipped back to 78.9% in 2000. Average Canadian per capita GDP growth was 2.74% over 1950-75 (compared to 2.15% for the US), with overall growth rates of 4.70% vs. 3.60%, respectively. Both economies, like most in the industrial world, enjoyed their fastest quarter century at this time, but Canada decelerated faster thereafter.¹⁷

The historical pattern of growth in Canada thus does not immediately suggest that the resource sector was a motor of growth with large positive spillover effects.¹⁸ The long-run

16. Canada's history of manufacturing protection is a fairly standard one (Pinchin, 1979). The policy debate on protection vs. freer trade was prominent in Canadian history, (e.g. the Reciprocity issue vis-à-vis the US) and at times became a major political issue. Canada's main railroad was built in the 1880s to lower the costs of east-west trade between Central Canada (Quebec and Ontario) and the Western region of the country. It was viewed by many as essential to keeping the country together against the economic pull of the US. Many saw the natural trading routes as North-South so it was thought that this tendency had to be countered by policy. McCallum (1995) later found that as of 1988 inter-provincial trade in Canada was much greater than that between Canadian provinces and American states, relative to what would be predicted by the level of economic activity in each region of Canada and the US and the distances between each pair of regions. In the absence of comparable data for earlier periods this left the question of whether the border was a major deterrent to trade mainly because of protection itself or also because of other factors also at work.

17. Canada's economy outgrew that of the US modestly over the twentieth century as a whole (3.85% per year to 3.29%) and even more modestly in per capita terms (2.05% to 1.95%). The bulk of the growth rate differential was thus offset by the more rapid growth of population in Canada, so per capita income rose only from 71.1% of the US level in 1900 to 78.9% in 2000 (data from Maddison, 2003, 87-89, with figures in 1990 Geery-Khamis dollars to improve comparability. Use of this methodology for comparison means that figures diverge somewhat from relative growth rates calculated in own currencies).

18. Even the history of growth in twentieth century Canada, such a hypothesis would be more plausible for manufacturing, as argued by Sachs and Warner (2001), though for the US case Wright and Czelusta (2007) argue that the mining industry was the source of much technological innovation with spillover effects on other sectors.

aggregate growth story shows a clear correlation between the rate of economic growth in Canada, both in absolute terms and relative to the US, and the importance of the manufacturing sector.¹⁹ Whatever this sector's interactions with and effects on the rest of the economy during its period of ascendancy, the country has not since then been able to regain the growth performance of that time, and the past decade has seen that growth slip to just 2% (2.46% up to the onset of the crisis in 2008). Still, in the absence of a good feel for the counterfactual, the record does not suggest that the resource sector (or any specific component of it) was a drag on growth. It seems implausible that manufacturing could have played a large enough role early in the country's history to pick up the slack for a smaller mining sector, given its small population and the considerable advantage that both the US and the UK had in many manufacturing activities. Like most natural resource exporters, a considerable share of Canada's manufacturing in the earlier days involved processing of natural resources.

Identifying the counterfactual against which to judge the role of mining involves quite different issues during the recent decades of manufacturing's declining weight in the economy and especially the last decade during which mining has leapt to prominence. Manufacturing's decline can be explained in part by the secular rise of services in virtually all economies. Canada's declining share of world manufacturing production calls for a different explanation, the most obvious element thereof being the globalization that has allowed lower wage economies and more aggressive ones like China to conquer an increasing share of world markets and of world production.²⁰

Keay (2007, 2008) has provided useful analyses of the impact of the resource sector on Canada's twentieth century economic performance. He estimates the direct loss from its absence (resource rents lost) as the difference between profits actually earned in the resource sector (defined as above) and foregone profits from the same amount of capital had it been employed elsewhere, assuming the same average rate of return as recorded for the rest of the economy and similarly assuming as opportunity cost of labour the mean average earnings elsewhere.²¹ So measured, the total average loss over the twentieth century would have been 10.3 % of GNP, mostly taking the form of lower total capital income (7% of GNP). He uses Granger causality tests for the possible spillover effects of the natural resource sector on the rest of the economy through its being a leading sector in the sense that its expansion in one period tended to be followed by expansion in other sectors later.²² Adding indirect effects in accord with the leading

19. Though its share of current price value added was falling markedly during the fast growth quarter century or so, its level remained relatively high during most of this period and the downward trend was due exclusively to the relative price decline for its products, not to slow output growth.

20. In raising its share of world manufacturing production, China took advantage not just of lower wages but also of an undervalued exchange rate which allowed it to achieve a balance of trade surplus, as well as industrial policies that allowed it to target certain industries through state support. A low exchange rate/balance of trade surplus allows more industries to co-survive; it involves keeping domestic absorption down. It is arguably the best recipe for sustained fast growth in countries that have the economic structure and the policy space to achieve it.

21. Keay (2007) uses a Tornqvist total factor productivity (TFP) index to compute levels of this variable across sectors and over time. With index 100 for the economy in 1900 he finds the resource sector generally had an above average TFP, about equal to that of non-resource intensive manufacturing. Services were systematically well below average. On average the resource industries were 48.9% more efficient than the aggregate economy (ibid 18). This higher TFP was presumably a main basis for the above average profits of the sector. Although the estimates have been carried out using two distinct series for capital stock (which differ on average only by 4% over the century and that mainly in the first quarter of it), the enormous estimated growth of TFP from the late 1940s to about 1980, followed by a marked fall in each broad category appears implausible and, over the period 1962-1998 is inconsistent with the estimates of Diewert (2001, 5-6). The doubtful accuracy of Keay's TFP series is thus a source of concern.

22. The Granger causality effects are contingent on inclusion of the energy extraction industries (26). Positive payoffs of the past have required and it has been important to keep the rents within the country (Keay, 2007, Table 3).

industry theory the contribution gets up to 17.8% of GNP on average, though slipping to 16% over 1971-1999. Keay (2008) concludes not only that the resource sector as a whole does not appear to have constrained the economy's overall per capita performance but that the government's share of resource rents rose from 9% in 1970 to 23% in 1999.²³

What does the evidence add up to on this issue, one that is complicated enough so that no single type of analysis can normally provide a definitive answer? On the one hand, growth was higher when the manufacturing sector dominated the economy. On the other, Keay's work adds weight to the view that the resource sector, and especially the energy sector, has had a positive impact on overall growth both over the twentieth century as a whole and even over the last quarter of the twentieth century by which time its share of GNP had fallen (Keay, 2008). Finally, even a modest level of confidence in the efficiency of markets means that in order to conclude that the sector made no contribution (or perhaps even a negative one) one requires a good empirical reason, like the negative association reported by Sachs and Warner (2001) and others between resource dependence and growth. In the process of weighing the issues, one must remember that some resources would be expected to make bigger contributions (either per unit of output or in total) than others, and that the payoff to resource industries does presumably vary over time. For Canada, the main question appears not to be whether resources in general or mining in particular have made significant contributions, but about their optimal size at various points of time, both in absolute terms and relative to other sectors, especially manufacturing or the high technology sector of today's world economy.

All this said, my own best guess (with a fairly wide confidence interval) is that the resource sector as defined by Keay raised twentieth century GNP in Canada by perhaps 5%.²⁴ This guess is based on:

- i) several reasons to suspect that Keay's estimated range is too high;
- ii) the worrisome evidence for a pro-resource interpretation that time-wise growth was maximized when manufacturing was strong; but
- iii) these views notwithstanding it is rather difficult to imagine a scenario in which other sectors (presumably especially manufacturing) could have used mobile resources more effectively than the best of the resource industries did. In the absence of a 'smoking' gun to suggest this, it seems likely that there was a net positive contribution. The main competing hypothesis would presumably be that manufacturing could have proceeded faster in the absence of the resource industries but for reasons mentioned elsewhere, this seems unlikely over most of the twentieth century.

Consider first the arguments for the view that Keay's estimated benefits are too high. In the nature of his calculation of benefits through linked activities, it is implicitly assumed that whatever activities would have been larger had the resource sector been smaller

23. On public sector revenues from the oil sector see also Dahlby (2012).

24. Although the discussion here is mainly framed in terms of the trajectory of Canada's GNP, it is certainly likely that, as a country of high net immigration during much of the period under discussion, a reduction in the scope of profitable activities in mining or anywhere else would have lowered that immigration. In fact there is probably more logic and interest in asking the question "how did the presence of the resource sectors affect the trajectory of per capita income in Canada?" than simply focussing on GNP. This however, would both complicate the discussion and take the counterfactual even farther afield than it is here.

would have had not linked effects of their own. The relevant question, however, is the size of the difference between such indirect benefits and there is no very strong reason to believe that those associated with mining are greater than those associated with other sectors. So the presence of differential linkage effects stronger than what would have characterized the alternative leading sector had the resources not been there still needs to be established.

As for the rent surplus estimated by Keay at 10.3% of GNP, it is striking that it amounts to 62% of the average 16.7% of GNP coming from the sector (Keay, 2007, 11). Profit rates tend also to be higher in this industry than elsewhere (Keay, 2008). Part of the return may be considered a payoff to an atypical level of risk-taking. High profits may also reflect use of special entrepreneurial talents, which should possibly be treated as an opportunity cost.²⁵ Keay uses Moody's AA industrial bond yields which, after adjusting for the rate of inflation imply a low real return to capital of perhaps 3% over the century. This probably underestimates the opportunity cost of capital and/or entrepreneurship in resource industries.²⁶ The average return to capital in manufacturing would likely be a better indicator of opportunity cost.

3.4 The mining decade: 2000 to the present

The record of the last decade differs considerably from the previous century, and hence warrants separate discussion. By this time manufacturing had weakened dramatically and globalization was a *fait accompli*. The energy sector was buoyant, becoming the leading export industry in 2008 (Cross, 2008)²⁷ as Canada underwent the same sort of reversal in the role of natural resource exports as have many Latin American and African countries. In the Canadian case, this mining surge has raised (or revived) three main questions: (i) is it contributing to a healthy overall growth process or are there Dutch disease elements at work? (ii) has it played a role in the observed increase in income inequality? and (iii) what are the environmental implications?

The manufacturing sector's current price share of GDP fell sharply from about 19% in 2000 to just 11% in 2011 (Huff Post Business, Feb.12, 2013, 2). Constant price output hit its peak in 2000 and by 2009 had fallen by 22.1%, or by 21% from its last local high in 2005. As in earlier decades, the relative price of manufactures continued to decline, both vis-à-vis the GNP deflator and, even more, in relation to the price of commodities. The recent descent had begun before the crisis of 2008 but was accentuated by it. Employment has fallen with output, as the sector shed one of six workers over 2000-2007, reducing its employment share from 16% to 12% and then on to 10% in 2009 as the recession's effects

25. Another part of these rents could reflect the use of monopoly power, in which case any part that was earned at the expense of Canadian buyers should not be included as a contribution to national income (though that part borne by foreigners would be). However, since Keay finds the predicted downward impact on input prices of related manufacturing industries, monopoly profits earned at the expense of Canadians may be very low if present at all.

26. Figures presented by Bai *et al.* (2006, Figure 10) suggest that aggregate rates of return to capital in 1998 for higher income countries typically fell in the range 7-9%.

27. The big increase has been since 2002, during which gross exports jumped from 45% to 65% of the total. In 2008 (includes petroleum based chemicals and agriculture). Their role in value added exports is even greater, rising from about 52% in 2000 (or 2002) to about 70% in 2008. Auto parts, the main manufacturing export, has a large import component of nearly 50%.

were felt (Stats Canada “Manufacturing”). Large manufacturing employment losses have been the norm in most OECD countries over the last two decades (e.g. one quarter in the US over 1998-2008). One current issue in Canada is how much of this decline may be recovered as economic growth proceeds in the years ahead; another is to what extent the recent decline has been associated with the strong appreciation of the Canadian dollar since 2002 and how much of that appreciation can be explained by the boom of natural resource exports.²⁸

There is no doubt that the commodity price boom since 2001 (with a more than doubling between 2002 and 2007 –Baldwin and Macdonald, 2009:22–) was tightly correlated with the sharp appreciation of the Canadian dollar over the same period. This followed a strong net depreciation relative to the US dollar over the 1980s and 1990s, which had helped to protect Canadian manufacturing, especially from US competition. Which activities within Canada have been discouraged by that appreciation is harder to sort out and I am unaware of any study that adequately addresses the question of how the surge may be affecting current growth and that of the short-medium run future. The Bank of Canada has, however, undertaken a shorter-run useful modelling exercise to assess the impact of higher oil prices on the country’s GDP. Depending on the scenario (i.e. where the oil price rise comes from), it is estimated to generate as much as a 3% increase in Canada’s GDP over 5 years in the case where the price increase is the result of a strong expansion of the US economy and the resulting increase in demand for Canada’s exports to that country (Globe and Mail, September 8, 2012). The model predicts that even if the increase in demand is driven by Asian growth (a more likely scenario) there is a 1% increase in GDP over that five year period, and that if it is due to a shock like unrest in Libya the increase is 0.2% gain. Non-oil producing regions do lose but not as much as might be expected since lost exports are partly made up by inter-regional trade. Since the latter two scenarios are the more likely, this exercise can be seen to support the hypothesis of a smallish contemporary benefit on the overall economy.

Accepting that Canada benefits from a price increase of a commodity export (i.e. assuming the model captures short-run reality reasonably well) does not imply that the country reaps benefits from its presence in the medium or longer run. A modeling exercise must be both very complicated and very subtle to incorporate and thereby assess the various mechanisms at work in natural resource curse cases.²⁹ I am unaware as to whether such a sophisticated model exists and if so what results it comes up with. One limitation of any model designed to measure the impacts of mining, especially of products like the controversial tar sands, is the fact (discussed below) that Canada still lacks a set of green national accounts which would systemically include estimates of resource discoveries, resource depletion and externalities like pollution and thereby provide a more accurate measure of economic performance.

28. One mechanism of exchange rate appreciation as part of some Natural Resource Curse experiences involves the fact that if, and as a sector with a strong comparative advantage is developing that advantage and pushing up the exchange rate through its rising exports, there may be a strong simultaneous inflow of capital which further appreciates the exchange rate, and to a level beyond what it will have when the FDI surge comes to an end. This means that other industries may be squeezed out even though they could have survived at the new higher equilibrium value of the currency produced by the new export pattern itself.

29. Relatively simple models can still be a useful and necessary tool in the analyst’s kit in trying to understand relatively simple issues like this one. Usually such models are weaker when it comes to the employment and inequality effect of a given change. than they are in predicting GDP effects. Employment may be allowed for in a partial way; inequality almost never is since the required model must be considerably more complicated and depends on a very good capacity to predict employment effects disaggregated by type of worker.

Has rapid mining growth contributed to employment problems and increasing inequality?

In terms of employment implications, the expectation that the dramatic rise of the mining sector in terms of income and of investment would not be matched by its contribution to employment is reflected in the data through 2008. While the sector's employment share rose from a local low of 1.27% in 1997 to about 1.71% at end 2011 (or by 0.44% of total employment) (Table 3) its share of (current price) output was rising from around 5% to 10%. Other sectors, therefore, had to increase their employment shares relative to their output shares. Manufacturing's output and employment shares dropped more or less in parallel, average labour productivity being a little but not far above the economy-wide average. The gainers in employment share were services (as in virtually all countries), most of them more or less non-tradables. Over 1997-2008 finance *et al.* was the big growth sector, with construction also expanding rapidly (raising its share of total employment by nearly 2 points).

The ultimate concern as a sector expands its output without much direct job creation, as mining has done, is its impact on the composition of labour demand, on wages and through those variables on income distribution. The impact of the sectoral recomposition of the last decade, if indeed it is significant, may be hard to identify quickly given the usual delays before in depth analysis can identify how inequality has been changing and why.

More is known, of course, about the trajectory of employment, wages and inequality during earlier decades. From a sectoral perspective, that period is more likely to reflect the impacts of declining manufacturing than those of the rise of mining. Scholars agree that pre-fisc or market income inequality has been rising in Canada since at least the 1970s, as has also been the case in most other industrial countries, and that there has been increasing concentration at the very top.³⁰

If the expansion of mining or the decline of manufacturing has contributed to either of these trends, then the timing of the increases in inequality may provide some relevant evidence.

30. According to Fortin *et al.* (2012:37) the Gini coefficient of the market family income distribution (more or less pre-fisc distribution) rose from around 0.28 in the late 1970s and the late 1980s to about 0.32 in 1998, since which time it has changed little. The Gini of disposable family income reveals the same general patterns, albeit with less sharp changes; in that case the increase is not evident until the 1990s and again seems to have run its course by 1998 or 1999. The increase in the share of the top 1% has been dramatic since 1980. That group's share, after plummeting over about 1939-43 from a peak of over 18% to about 10%, and then easing down to under 8% just before 1980s, leapt to an average of 13-14% over the last decade (with considerable variability). Wage inequality has increased markedly over 1980-2005 for men, with the median male earnings constant, those of the 10-25th percentile falling by 10% and those of the 90th percentile rising by 18% (Fortin *et al.*, 2012:5) The pattern was similar but slightly less pronounced for women. Women's wages grew more than those of men throughout most of the distribution and rose even for the 10th percentile (by 5%, compared to 30% for the 90th percentile).

Table #3. Sectoral composition of employment, 1990, 1997, 2008 and 2011 (Dec.) (Absolute numbers in hundreds of thousands)

Sector of Activity	1990		1997		2008		2011 (Dec.)	
	Number	%	Number	%	Number	%	Number	%
Agriculture, <i>et al.</i>	531	4.22	537.3	3.85	402.9	2.35	364.3b	2.10b
Mining	180	1.43	177.2	1.27	264.2	1.54	297.0b	1.71b
Manufacturing	2001	15.92	2166.8	15.54	2040.9	11.92	1733.6	9.99
Utilities	123	1.08	139.9	1.00	151.8	0.89	133.8	0.77
Construction	778	6.19	747.3	5.36	1232.2	7.19	1264.9	7.29
Commerce, restaurants & hotels	3014	23.97	3283.9	23.56	4024.6	23.59	3782.4	21.79
Transport, etc.	8.15	6.48	897.1	6.44	1148.2	6.71	n.a.	
Finance, business services, <i>et al.</i>	1456	11.58	1799.9	12.91	2962.1	17.30	n.a.	
Community, social & personal services	3661	29.12	4191.1	30.06	4961.3	28.97	n.a.	
Previous three categories	47.18		49.41		52.97		56.35	
Total	12572	100.00	13941	100.00	17125.8	100.0	17354.7	100.0

Source: ILO, LABORSTA, on line. For 1990, 1997 and 2008; Statistics Canada on line for 2011.

Factors playing a role in the increasing inequality clearly include the widening gap by level of education (Fortin *et al.*, 2012:11), though in Canada educational wage differentials increased much less than in some other countries, especially the US; post secondary and especially university education grew much faster in Canada. Even more important has been the dramatic widening of the wage gap among age groups, occurring mostly during the two recession (1980s, early 1990s); new entrants fell behind more experienced workers and never caught up. The two main factors identified as working through these correlations with personal characteristics to explain the rising pre-fisc inequality are globalization and technological change (TC), with both generally accepted to be important but there being no consensus as to which has had the stronger impacts. Globalization is expected to raise the returns to capital and the wages of complementary (presumably high-skill) labour while lowering the wages of the relatively unskilled, and most analysts conclude that this has been the case. A traditional view is that technological change has also pushed up the demand for well-educated workers because most such change has been biased towards skilled labour as well as towards capital³¹ (Goldin and Katz, 2008). A more recent view argues that it is tasks in the middle of the wage distribution that are most negatively affected (the “routinization hypothesis”), resulting in a polarization of

31. Note that a strong sector shift towards a capital intensive high labour –productivity sector shows up in the aggregate figures as a capital-biased TC.

incomes (Fortin *et al.*, 2012:13). The routinization-based TC hypothesis seems to be able to explain the polarization of wages and employment in the US and of employment in Canada and some European countries. Declines in real minimum wages (MWs) and in unionization are among the institutional factors often considered to have contributed to the observed increases in pre-fisc inequality in industrial countries. The declining real value of the MW played a major role in the US in the 1980s, especially among women. Since the mid-2000s there have been large increases in virtually all provinces especially since 2008; Fortin *et al.* (2012:14) believe they have contributed to the large increases in real wages in the lowest percentiles.

What, if anything, does this fairly wide-spread consensus that rising inequality has been the result of TC, globalization (including outsourcing) and declining unionization suggest about the roles of a rapidly declining manufacturing sector and a growing resource sector, with mining as its single key component? Most analyses like those cited above do not focus on the role of intersectoral shifts in the composition of output and employment, so the likely effects of such shifts must be guessed, based on how they may be related to the identified factors in rising inequality. Economic logic suggests that the growth of mining will have contributed to rising inequality (through its capital intensity and high average profits), as will the rising share of finance (through its skilled-labour intensity and high profits) and the falling share of manufacturing (lower capital and skilled-labour intensity and lower profits). These trends are of course due in part to factors exogenous to the Canadian economy and in even greater degree exogenous to Canadian economic policy. Since both the growth slowdown of recent decades and the increase in inequality have been the norm across the industrial countries, including some like Canada that have large natural resource sectors and others of which this is less the case, it seems unlikely that the natural resource base has been a major factor in these trends. As always, the question of what impact the mining surge has had needs to be analyzed against a specific counterfactual or alternative. Thus it is different to ask whether mining has made a positive contribution in a setting in which manufacturing was doomed in any case to decline vs. a setting in which mining was the source of that manufacturing decline.

3.5 Managing mineral volatility in Canada

One of the special challenges mining brings is dealing with the inevitable shorter and longer run earnings fluctuations in such a way that they do not impinge negatively on the economy as a whole and that an appropriate share of them is saved for use by future generations when such high rents are no longer available. A related challenge is to channel high profits to other sectors when that is an economically sensible thing to do either through the public sector or in some other way. One prominent instrument of policy in some countries is a stabilization fund that grows during the period of natural resource exploitation and is run down later when the resources are no longer available or not producing as large a revenue stream.

Canadian provinces control the use of and the bulk of the revenues from mineral resources and Alberta has the largest revenues from them and the main stabilization fund which, despite a very promising beginning has suffered from a deteriorating performance over time. The logic of saving some windfall benefits from export price booms has been part of the public debate for decades in Canada, but the record looks weak beside such clear success stories as Alaska and Norway.³² The Alberta government of visionary premier Peter Lougheed created the Alberta Heritage Fund over 1974-76. In the judgment of Warrack (2005), this fund performed well for a period of time, both in putting funds aside for a future with less mineral revenues and in directing some of the income towards especially valuable uses with likely long-run payoffs. Innovative social policies received attention at the start, including human rights-related legislation like the reform of the administration of the lower courts. Arts facilities were a high priority. There were advances on education and a hallmark success was the Alberta Heritage Foundation for Medical Research. Lougheed's government was also endowed with a strong environmental consciousness, so the energy-environment interface became a priority. But this generally impressive start gradually gave way to mediocrity or worse. In the beginning 30% of non-renewable resource revenues were allocated to the Fund, but in 1982 this was halved and since 1987 no allocations have been made (Warrack, 2005:14). Purchasing power was eroded since the fund was not inflation-proofed until 1997. In recent years social policies have "fallen off the radar screen" and environmental issues have gradually lost priority, with environmental regulation largely left to the private sector. Warrack (2005:16) mentions the forestry sector as arguably a positive story under this setup, but the same cannot be said of mining.

Warrack attributes part of the less than impressive record of the Alberta Heritage Fund to its different institutional base vis-à-vis success stories like Alaska and Norway. With comparably sized populations (as of 2012, Norway had about 4.7 million people and Alberta 3.85 million) and only moderately higher production in Norway than in Alberta over the years, Norway's fund (created in 1990) was recently valued at US\$73 billion while Alberta's is 15.4 billion. In the case of Norway, the rents are not used either to keep taxes low (they are relatively high) nor to fund current social programs but rather to be there when future needs arise. Unlike Alberta it invests its funds offshore, thereby avoiding possible Dutch disease creating impacts on the exchange rate.

Given the provincial control of natural resources in Canada, the sort of constitutional mandate (as with the Alaska Permanent fund and as in Norway³³) was not part of the process of creation. In Alaska the citizens voted for the fund and the money was thenceforth put aside for the future, protected from current fiscal budgetary pressures and managed by an arms length board of trustees. Alberta's fund was established by ordinary legislative process and at a time when there were still no well-established precedents from which to learn. The capital base of the Alaska Fund cannot be dismembered without public approval

32. Newfoundland, the other province with large oil revenues (larger on a per capita basis than those of Alberta) is a more recent arrival to the club of "haves" and contrasts with Alberta in having been one of the lowest per capita income provinces before the oil discoveries. As in Alberta there has been much political emphasis on lowering personal income taxes (from the highest in Atlantic Canada to the lowest –Reid and Collins, 2012:19) and on large spending initiatives. Karl (1997) identified this latter as a feature of governments of countries recently enriched by resources. Galenson (1986) attributes part of Norway's behaviour to its being already wealthy when oil was discovered, while Thurber and Istad (2010, 6) allude to its advantage of being a mature open democracy blessed with bureaucratic institutions experienced in regulating other natural resource industries.

33. The Chilean Economic and Social Stabilization fund, which replaced the Copper Stabilization Fund in 2007, combines the objective of saving from the surplus of resource-based income and macroeconomic stabilization, following a formula (now enshrined in Chile's constitution) to balance the budget over the economic cycle.



in a referendum. As a province rather than a nation, Alberta does not have control of the country's macroeconomic or exchange rate policies, so the different decisions on this front cannot be attributed to the province, but the decision to keep taxes low can be. In Alberta intentions were good and initial governance appeared satisfactory but the system was not resilient to changing fiscal circumstances. Though Alberta is presumably better off for having its fund, it has gained much less than Alaska, Norway or the other big successes. Things can be learned both from success and from relative failure.

4. Some aspects of the politics of mining in Canada and the current debates

Canadian governments have, unsurprisingly, been favorable to the mining sector (and more generally to the natural resource sector (including agriculture, fishing and forestry) since it has been an important part of the country's economic history. Currently mining interacts with politics in Canada in a number of ways.

1. *Air and water pollution from various mineral activities and the global warming effect of the Alberta Tar sands.* This interface pits industry supporters against those concerned with the environment, both at home and abroad, and has contributed to Canada's bad international reputation on environmental issues, based on high rates of air pollution in relation both to population –where Canada and the US stand out at about four times the world average and nearly that far above a green developed economy like Sweden (Table 4)– and to GDP.³⁴ On the latter count they rank well ahead of high polluting developing countries, especially China, but well behind the greener of the developed countries, like Japan, Germany and Sweden. No national government of Canada has thus far taken environmental issues as a whole seriously, i.e. gone beyond rhetoric towards a true policy.³⁵ As has often been the case in other policy areas (like health), some provincial governments have moved ahead of the national one. On the environmental front this currently includes most prominently Quebec, Ontario, and British Columbia. At the national level, Chrétien's Liberal government (1993-2003) signed the Kyoto protocol but did little to implement it. The current Conservative government, representing more clearly the interests of business and of Alberta, has taken a more militant stance against biting regulations, and has resorted to delaying or cancelling environmental studies and to attacking some environmentalists opposing the tar sands development as “eco-terrorists” on the grounds that they may attack oil sands infrastructure like pipelines.³⁶ The setting it tries to induce is thus not one of open discourse but an, unusually for Canada, attempt to limit such discussion. Many environmentally concerned Canadians assume at this point that a pro-environment policy will only be implemented in Canada if and when the US government tightens up its own standards and/or exerts more pressure on Canada, or when the Canadian government changes.³⁷

34. In terms of total CO₂ emissions, Canada ranked eighth in 2008 according to UN estimates.

35. As argued, for example, by Mark Jaccard, one of Canada's most prominent environmental economists, who takes a middle of the road stance on sustainability issues and has served on the Intergovernmental Panel on Climate Change. He was an early advocate for carbon taxes and electricity regulations. He challenged the assumption that humanity must stop using fossil fuels in order to save the planet, arguing that Canada's fossil fuels will be the cheapest source of clean energy for the next century, that our ability to use fossil fuels without emitting harmful greenhouse gases, through carbon capture and storage technologies, can buy us time to develop renewable energy technologies and arrive at a sustainable global energy system in the future (Jaccard, 2006). However, the failure of Canadian governments to take the appropriate steps to make this future feasible has led to his recent critiques of policy (Jaccard, 2012, 2013).

36. A recent national survey reported that half of Canadians considered there to be either a high (15%) or moderate (35%) threat of eco-terrorism in the form of an attack on some energy facilities (e.g. pipelines). (Abacus Data, August 20, 2012) due to growing radicalism among eco-activists. Support for measures to protect against such attacks (60% overall) was highest among Conservative voters (81%), seniors (70%) and Albertans (69%).

37. Stephane Dion, leader of the Liberal party during the 2008 federal election, put forward the first serious emission control policy, the strongest electoral promise ever made by the leader of one of the two historically dominant parties in Canada, labeled *The Green Shift* and designed to create an ecotax on carbon while reducing personal and corporate income taxes by a comparable amount. The plan was vigorously criticized by Prime Minister Harper as a tax grab and likened to the National Energy Program adopted by the federal Liberal government in the 1980s and permanently resented by the energy-rich provinces of the West. The Liberals lost badly in the 2008 election, a fact that has no doubt left leaders of major parties skittish about facing up to the obvious need for some sort of carbon tax.

Table #4. Carbon dioxide emissions in relation to GDP and to population, selected countries, 2008/9

Country	Share of world CO ² emissions (2008)	Emission per unit of GDP ^a (2009)	Emissions per capita ^b (2009)
Canada	1.82	0.44	15.24
United States	18.27	0.42	17.28
Germany	2.63	0.28	8.97
Japan	4.04	0.29	8.63
Sweden	0.16	0.15	4.70
China	23.53	0.93	5.77
India	5.83	0.58	1.64
World	100.00	0.50	4.06

Kilograms per dollar of GDP, measured in 2005 purchasing power parity international dollars.
Metric tons per capita.

Sources: Column 1 from United States Department of Energy, Carbon Dioxide Informal Analysis Centre (CDIAC), reproduced by Wikipedia. Columns 2 and 3 from World Bank data on line.

As noted above, Canada still lacks a set of green national accounts which would systemically include estimates of resource discoveries, resource depletion and externalities. The most important such externality from the energy sector now is on the atmosphere and on global warming. Shiell and Loney (2007, 434) estimate for 2004/2005 a value of damages from greenhouse gas emissions in the range \$15-64 per ton of carbon or \$2-8 per barrel of oil, leading to a central estimate based on the case of Suncor of an 18% decrease in the net social benefit (the range being from 4% to 33% for fairly extreme assumptions on oil prices, vigor of the pursuit by the companies of emission reductions, etc.). The wide range indicates how much remained to be analyzed and understood in this area (after their analysis was undertaken, the price of oil has rose substantially, making the net benefit figures higher, but it has recently fallen again). In a recent estimate, Chan *et al.* (2012) use the MIT Emissions Prediction and Policy Analysis general equilibrium model to conclude that without climate policy Canada's bitumen production would increase by fourfold over 2101-2050, with climate policies implemented in developed countries, production would fall short of that level by 32-68% depending on the viability of carbon capture and storage (CCS) implementation, and that with worldwide implementation of climate policies bitumen production is significantly produced even with CCS.

The level of public discussion in Canada on the economics of mining and oil in general and on their environment impacts in particular remains low, as is the case also in the US. Although Canada, like the US, is less green-oriented than European countries, there is a degree of concern for the national and global environment. The national Green Party usually receives 5-10% of the total vote. In the last election (2010) it elected its first member of Parliament. As in the US, some policies are advanced on a provincial or city level, while others are national. The former leaves greater scope for innovation and self-determination. Canada's multi-party system, however, leaves

open the door for a majority national government like the present one (elected with support from under 40% of voters) to take a strongly anti-environmental stand. Its pro-business stance and the lure of dollars from the tar sands combines with little apparent interest in the environment. Canada's recent history demonstrates that countries with a record of generally progressive policies on a number of fronts can slip very seriously on this one. Opponents of controls have been able at least temporarily to sideline the obviously preferred policy option, some form of carbon tax, partly by emphasizing that it is a "tax" and by arguing that it will be an impediment to business. Meanwhile all serious students of the issue accept that this is the preferred policy option (Nordhaus, 2012; Jaccard, 2013) and bemoan the fact that the flow of politics may make it hard to take advantage of for some time.

A technically serious debate on the exploitation of the tar sands in Canada would focus attention on the matter of timing. A defensible policy would be simply to delay that exploitation until the technology allowed it to be clean enough to meet desirable world standards on such exploitation. The resulting additional incentive to find/develop such technology would be a strong spur for the needed innovations.

2. Large mining activities, like oil in the province of Alberta, create differences of regional interest since the benefits accrue mainly in one area and there is a plausible fear in other regions that the net impact on them is or will be negative, in particular those relying heavily on the manufacturing activities concentrated in Central Canada (Ontario and Quebec). The easily identifiable aspect of this negative effect on private activities occurs through exchange rate appreciation in response to an expanding export activity (say Alberta oil) which puts existing tradables (say Ontario manufacturing) at a new or additional disadvantage. This impact is at least partially offset through positive interregional spillover effects from the expansion of the Alberta economy in the form of greater purchases of goods and services and hiring of workers from other provinces (e.g. the usually less prosperous Atlantic provinces). The other element of Canada's situation is the high degree to which public sector revenues based on mining accrue to the provincial governments (Dahlby, 2012).
3. As in most other countries, mining brings conflicts with indigenous peoples, who in Canada have unresolved claims on much land and who fear *de facto* eviction from lands valuable for mining or for the transport of mining products (pipelines), and/or not getting what they consider a fair share of the rents from this industry. These concerns have deep roots in the historical mistreatment of the indigenous peoples in Canada. Such conflicts have a good deal in common with those of other countries, but settings also differ in important ways, and there are relatively few violent deaths related to conflict around mining. Greater current awareness by Canada's voting public of possible negative impacts and the perhaps greater (albeit small) direct political influence of the native peoples in Canada's policy than in times past is a positive sign. Within Canada the displacement of aboriginal peoples from their traditional lands, how their long-standing land claims are settled and whether pipelines will be able to pass through their lands have become political issues. But the direct political

influence of aboriginal peoples is limited by their relatively small numbers (and hence parliamentary base) and the great difficulties in speaking with one voice, given the many different groups and their dispersion over enormous spaces. There cannot be a government takeover in Canada by or on behalf of indigenous groups as has in a sense occurred in Bolivia with Evo Morales.

Different Canadian governments have approached aboriginal issues in somewhat different ways, but few have assigned much priority to them and none has been very successful. The current administration is not expected to give more weight to indigenous issues than is forced by public opinion as it might be manifested in future elections, and appears to be assiduously avoiding any steps (e.g. in the details of international conventions signed) that could strengthen aboriginal rights to land.

4. The impact of Canadian mining activities abroad has given rise to a number of allegations of human rights abuses and environmental degradation. These criticisms circulate most strongly around the gold industry, and are most strident in countries with bad human rights records, including Colombia, Guatemala and Honduras in the Western hemisphere, and ones with weak levels of governance, as in the case of Papua New Guinea. Canada's smaller or 'junior' companies are often cited as the worst offenders; they do not have reputations to maintain and are by nature involved in more speculative activities, prospecting in particular, than are larger, more established firms. The Colombian story is striking and illustrates the potential damage that such companies can do without necessarily being the direct perpetrators of such effects.³⁸ There is some awareness elsewhere in Canada of the alleged depredations of Canadian mining firms abroad, and a degree of protest. But the industry has reacted vigorously. For example, Barrick Gold served a "preventive formal notice" to two publishers, seven authors and two translators of a manuscript not yet fully complete, threatening to sue whoever published a book judged libelous in their judgment. The book (Deneault and Sacher, 2012) was eventually published, after the initial publisher, which had commissioned the volume, backed off in the face of this pressure. Free speech activists have picked up this cause. The book maintains that Canada, and in particular Toronto, is home to so much activity in mining because "Canada is a 'judicial paradise' for the industry, with subsidies taking the form of *de facto* permitting access to tax havens in the Caribbean and other steps. Having tax laws that favour a successful industry would hardly be unique to Canada, but the freedom of speech issue is of great concern. Meanwhile, the Canadian government has taken the controversial step of tying foreign aid to corporate social responsibility projects carried out by mining-funded NGOs.
5. Although Canada does not have the major corruption problems of many developing countries and has a moderately transparent government, the latter especially is a matter of degree and on the environmental issues the present government has tried to keep a good deal from the probing public eye. Fairly blatant dishonesty and manipulation of public opinion have been part of the story.

38. The town of Marmato in Colombia, the site of a conflict between artisanal miners and a Canadian company planning to develop and open-pit gold mine, has become a cause celebre since the murder by unknown parties in September, 2011 of Father Restrepo, the local priest who spoke out against the mine. According to one theory, the murderers were acting on behalf of Colombians who expected to benefit from the mine.

5. Lessons for developing countries

Canada has depended substantially on natural resources throughout its history and has had a reasonably important though never dominant mining sector since the second quarter of the twentieth century –only over the last decade did its share of GNP come to exceed 6% and its share of exports (when processed mineral products are included) reached a peak of well over 50% in 2008–. The twentieth century was by and large a good one for Canada, allowing it to move into (stay in) the top tier of countries by per capita income and to gain a little ground on the US. One of the concerns of some Canadian staple theorists and of more recent writers on the Natural Resource Curse, not to mention Marxist-Leninist thinking, that a natural resource specialization would preclude development into a productive industrial economy, was not borne out by the record, as manufacturing was by 1950 the dominant sector of the economy with nearly 30% of GNP. Subsequently the weight of that sector diminished dramatically, partly due to the normal increase in the service share in highly developed economies and partly because, like other industrial countries, Canada’s share of world manufacturing production shrunk as part of the process of globalization in which lower wage countries and aggressive traders increased their shares. This shrinkage substantially overlapped with the period of rising pre-fisc inequality in Canada and elsewhere. Since mining was not yet a large component of the economy in Canada (and was unimportant in many other countries where inequality rose), it seems unlikely that it contributed significantly to the increase in inequality in Canada over the last decades of the twentieth century and much more likely that the growth of finance played significant role.

The decade since 2000 is a new chapter in Canada’s mineral history, as the country has ridden a major oil boom into a situation where mining accounts for 10% of GDP and a substantial majority of all net exports. Given the recentness of this phenomenon it is still too early to judge its impacts on the economy and on the country. It is unlikely that its rise, even though it appears to have been the main factor in the appreciation of the Canadian dollar since 2002, has accounted for much of the recent decline of manufacturing, though economic logic suggests that it has probably accounted for some of it. It is also too soon to judge how well Canada will manage this mineral surge. The experience with provincial stabilization funds (mainly Alberta) is not reassuring despite its very promising start. Canada has been a notorious laggard on environmental policy to rein in greenhouse gas emission and the politics-based and anti-scientific handling of this issue has become very worrisome.

In summary, one reading of the Canadian story has the modest-sized mining industry playing a positive supportive role in overall development over more than a century, in part directly and in part by contributing to the development of various manufacturing industries and other linked activities. After climbing the manufacturing mountain with considerable success, and attaining the output structure of a modern rich economy, Canada has reverted towards greater dependency on natural resources, especially mineral ones. A free trader would say “fine, let us follow the dictates of the market” and an economic nationalist might say “we have lost growth potential and economic independence”. Neither of these views in their simpler versions should be taken seriously. Canada, like nearly all countries, needs to continually rethink its situation in its new circumstances.



The international record makes it clear that many countries have benefited greatly from mining and other natural resource exploitation and that many others have not—especially when employment and income distribution outcomes are taken into account. Analysis of what distinguishes these groups remains relevant to countries like Canada as well as to the resource-endowed developing countries.

REFERENCES

- Auty, Richard M. (2001). *Resource Abundance and Economic Development*. Oxford: Oxford University Press.
- Bai, Chong-En, Chang-Tai Hsieh and Yingyi Qian (2006). "The Return to Capital in China". Cambridge, MA: The National Bureau of Economic Research, Working Paper 12755.
- Baldwin, John R. and Ryan Macdonald (2009). *The Canadian Manufacturing Sector: Adapting to Challenges*, Economic Analysis Division, Statistics Canada, Research paper. 17)
- Barro, Robert J., and Xavier Sala-i-Martin (2004). *Economic Growth*. MIT Press. Cambridge, Massachusetts (2004).
- Beckford, George (1982). *Persistent Poverty: Underdevelopment in Plantation Economies of the Third World*. Oxford Univ. Press.
- Brean, Donald J. S. (2001). "Canadian Extractive Industries: Taxation, Finance and Foreign Ownership" in Donald J.S. Brean and Manuel Glave (editors), *Natural Resources and Development*, Santiago: CIEPLAN.
- Calvo-Gonzalez, Oscar, Rashmi Shankar and Riccardo Trezzi (2010). "Are Commodity Prices More Volatile Now? A Long-Run Perspective". Washington, D.C.: IMF Policy Research Working Paper 5460.
- Cardoso, Fernando Henrique and Enzo Faletto (1979). *Dependency and development in Latin America (Dependencia y desarrollo en América Latina, engl.)*. University of California Press.
- Cashin, Paul and John McDermott (2002). "The Long-Run Behavior of Commodity Prices: Small Trends and Big Variability". *IMF Staff Papers*, Vol. 49, No. 2, pp. 175-199.
- Cha, Gabriel, John M. Reilly, Sergey Paltsev, and Y-H Henry Chen (2012). "The Canadian Oil Sands Industry Under Carbon Constraints". *Energy Policy*, Vol. 50, No. 1, pp. 540-550.
- Corden, W. Max and J. Peter Neary (1982). "Booming Sector and De-industrialization in a Small Open Economy, *The Economic Journal*, no. 92, December, pp. 825-848.
- Cross, P. (2008). "The Role of Natural Resources in Canada's Economy", *Canadian Economic Observer*, November, pp. 3.1-3.10.
- Dahlby, Bev (2012). "Public Sector Revenues from the Oil and Gas Sector in Canada", Department of Economics, University of Alberta.
- Davis, G.A. (1995). "Learning to Love the Dutch Disease: Evidence from the Mineral Economies". *World Development*, 23 (10): 1765-1779.
- Deneault, Alain and William Sacher (2012). *Imperial Canada Inc.: Legal Haven of Choice for the World's Mining Industries*. Talonbooks.
- Diewert, W. Erwin (2001). "Productivity Trends and Determinants in Canada", Vancouver, B.C. University of British Columbia, Department of Economics, Discussion Paper No.: 01-15.
- Easterbrook, W. Thomas and Mel Watkins (editors) (1967). *Approaches to Canadian Economic History*.
- Frenette, M, D.A, Green and K. Milligan (2007). "The Tale of the Tails: Canadian Income Inequality in the 1980s and 1990s". *The Canadian Journal of Economics*, Vol. 40, No3, pp.734-764.
- Fortin, Nicole, David A. Green, Thomas Lemieux, Kevin Mulligan and W. Craig Riddell (2012). "Canadian Inequality: Recent Developments and Policy Options" forthcoming in Canadian Public Policy.
- Furtado, Celso (1971). *Development and Underdevelopment*. Berkeley: University of California Press.
- Galenson, Walter (1986). *Welfare State Strikes Oil*. Lanham, Maryland: University Press of America.
- Gelb, Alan and Associates (1988). *Oil Windfalls: Blessing or Curse?* New York, Oxford et al.: Oxford University Press for the World Bank.

- Jaccard, Mark (2006). *Sustainable Fossil Fuels: The Unusual Suspect in the Quest for Clean and Enduring Energy*. Vancouver, B. C.: Simon Fraser University School of Resource and Environmental Management, Energy and Materials Research Group.
- Jaccard, Mark (2012). *Deluding Ourselves to Disaster: Why we fail to act on the climate threat*. Vancouver, B. C.: Simon Fraser University School of Resource and Environmental Management, Energy and Materials Research Group.
- Jaccard, Mark (2013). "The Accidental Activist, *The Walrus*, Feb. 21.
- Karl, Terry L. (1997). *The Paradox of Plenty: Oil Booms and Petro States*. Los Angeles: University of California Press.
- Keay, Ian (2007). "The Engine or the Caboose? Resource Industries and Twentieth-Century Canadian Economic Performance". *The Journal of Economic History*, Vol. 67, No. 1.
- Keay, Ian (2008). "Resource Intensive Production and Aggregate Economic Performance: 1970-2005", Queens Economics Department, Working Paper 1176.
- Mackintosh, W. Archibald (1923). "Economic Factors in Canadian History", *The Canadian Historical Review*, IV, pp.12-25.
- McCallum, John (1995). "National Borders Matter: Canada-U.S. Regional Trade Patterns", *American Economic Review*, Vol. 85, No. 3, pp.615-623.
- Madisson, Angus (2003). *The World Economy: Historical Statistics*. Paris, OECD Development Centre.
- Myint, Hla (1958). "The Classical Theory of International Trade and the Underdeveloped Countries" *Economic Journal* **68**, pp. 317-337.
- Nordhaus, William D. (2012). "Why the Global Warming Skeptics Are Wrong", *The New York Review of Books*, March 22.
- Pinchin, Hugh McA. (1979). *The Regional Impact of the Canadian Tariff (1979)*, Ottawa: Economic Council of Canada.
- Reid, Scott and Jeff Collins (2012). "Oil, Politics and Public Policy: A Case Study of Newfoundland and Labrador", Paper presented to the Canadian Political Science Association, Edmonton, June, 2012.
- Sachs, Jeffrey D. and Andrew (2001)., "The curse of natural resources", *European Economic review*, Volume 45, Issues 4-6, pages 827-838.
- Sala-i-martin, X. and Subramanian, A. (2003). "Addressing the Natural Resource Curse: an Illustration from Nigeria". Washington, D.C.: IMF Working Paper WP/03/139.
- Shiell, Leslie and Suzanne Loney (2007). "Global Warming Damages and Canada's Oil Sands" *Canadian Public Policy*, Vol. XXXIII, No. 4.
- Sunkel, Osvaldo, and Cherita Girvan (1973). "Transnational capitalism and national disintegration in Latin America." *Social and Economic Studies* (1973): 132-176.
- Thurbur, Mark and Benedicte T. Istad (2010). "Norway's Evolving Champion: Statoil and the Politics of State Enterprise". Working paper #92, Program on Energy and Sustainable Development. The Freeman Spogli Institute for International Studies at Stanford University.
- Urquhart, Malcolm C. and Kevin H. Buckley (1965). *Historical Statistics of Canada*. Cambridge: Cambridge University Press and Toronto: Macmillan Company of Canada.
- Warrack, Allan A. (2005). "Alberta Heritage Fund: Blessing Becoming Curse", Edmonton: University of Alberta, Western Centre for Economic Research. Paper presented at the conference of the Academy of International Business, Quebec, Canada, July, 2005.
- Wright, Gavin and Jesse Czelusta (2007). "Resource-Based Growth Past and Present", in Daniel Lederman and William F. Maloney (eds.), *Natural Resources: Neither Curse nor Destiny*. World Bank/Stanford University Press, 183-211.

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