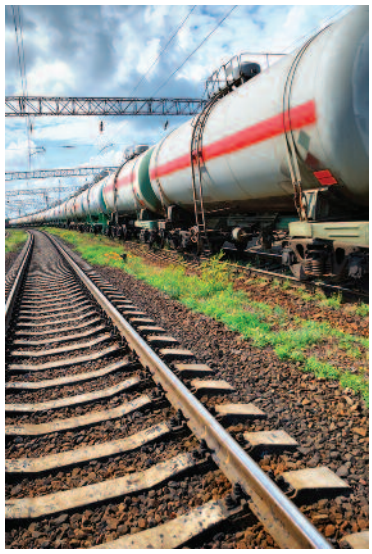
2

Adding Value to Canada's Petroleum Wealth: A National Economic and Environmental Priority

Jim Stanford



ABSTRACT

For some, there is nothing wrong with Canada becoming increasingly dependent on the extraction and export of raw resources. Merely extracting the resource, in this world view, is all the "value-added" that is needed. This approach implies that unexploited natural resources are value-less and hence "wasted," and that it is, in fact, preferable to focus on extraction and allow other nations to do the work of innovation, engineering, design, and manufacturing required to convert our raw resources into value-added products and services. Fortunately, most Canadians appreciate the risks – economic, environmental, geopolitical – of our country becoming a mere source of raw materials for other, more developed economies, who then process those resources and sell us back the (more expensive) finished products. They want something bigger for our country: an economy based on talent, innovation, ingenuity, and productivity. With active attention paid to ensuring that resource industries contribute, rather than detract, from the prospects of other value-added sectors, Canada's resource wealth could become a stepping stone toward a more diversified, prosperous, and sustainable economic future.

In this chapter, we begin by reviewing several empirical indications of Canada's growing and dangerous reliance on raw resource extraction and export, and our resulting national specialization at the very bottom rungs of the value-added ladder. Next, we consider some broader risks and consequences of this growing resource-dependence, including stagnant productivity and innovation, future economic instability, and environmental degradation. Following this, we consider in detail the economic evidence regarding the negative spillover effects of the petroleum boom (experienced largely through an over-valued exchange rate) onto non-resource export industries. Finally, we conclude with some preliminary proposals for enhancing the value-added linkages and spin-offs associated with Canada's petroleum industry.

Introduction: Canada's Structural U-Turn

The dramatic expansion of petroleum extraction since the turn of the 21st Century has sparked a fundamental structural transformation of Canada's economy. Booming investment and employment in new petroleum projects in northern Alberta has been the most important driver of this growth. There are many economic and fiscal benefits generated by the petroleum boom including new jobs, incomes, exports, and tax revenues. But there are many challenges and problems associated with the unbridled expansion of this sector too. It is important for policy-makers to examine both sides of the ledger, and to develop and implement policies which maximize the benefits for Canadians (and minimize the costs) of our important non-renewable resources. In particular, proactive efforts to increase Canadian value-added content throughout the value chain of our economy, even as our production of resources grows, would enhance the net benefits to Canadians from resource extraction. Measures to this end could include boosting Canadian content in inputs to petroleum and other resource sectors; increasing Canadian processing and manufacturing of our resource commodities after they are extracted; and being careful to support and protect other value-added export industries (with no direct connection to resources) from being damaged by the macroeconomic side-effects of the resource boom.

Of course, as a resource-rich and relatively sparsely populated country, Canada has always depended on resource industries as the first step in economic development. Successive waves of resource development, oriented toward export markets, motivated corresponding waves of settlement, transportation development, and government. Fish, furs, timber, wheat, minerals, and now petroleum were the industries (called "staples" by economic historians) that led the way through these successive chapters of our national economic history.

The leading role of resource industries in the economic development of Canada is a historical fact. But Canadians have been traditionally concerned, and rightly so, with the potential downside of unthinking resource-dependence. Historians and economists (including

pioneering thinkers like W.A. Mackintosh, Harold Innis, and Mel Watkins) described how each successive wave of staples-led development shaped the resulting pattern of economic, political and social development – and not always for the better. It was possible for Canada to become caught in a "staples trap," in which the dominance of a particular form of resource extraction and export inadvertently undermined our ability to develop and diversify a full-fledged modern economy.[1]

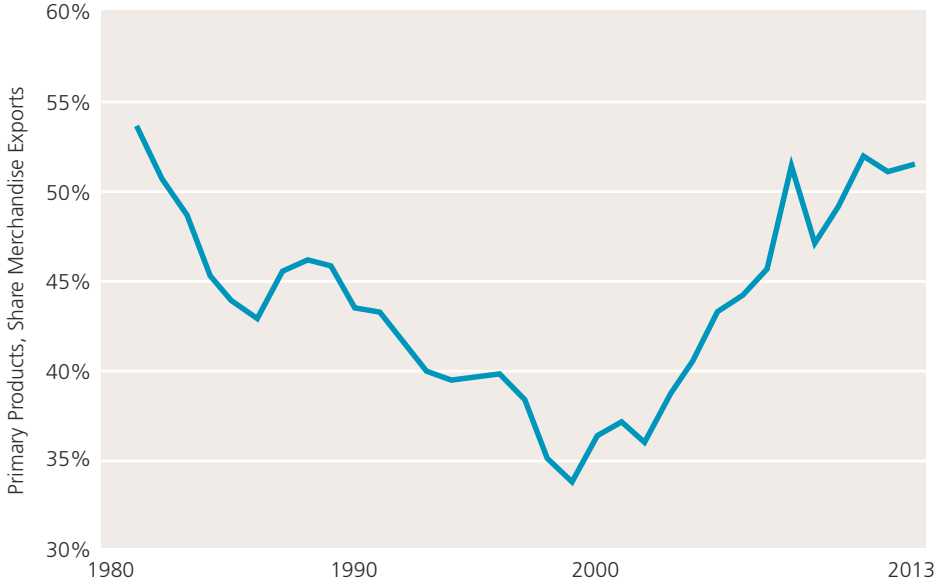
To counteract this risk, economic policy-makers since Confederation were preoccupied with measures to supplement resource industries by nurturing a more diverse "value-added" economy. Instead of simply extracting and exporting raw resources as fast as possible, and then using the resulting export revenues to pay for necessary imports (of manufactures and other value-added products), Canada should develop more value-added industries of our own. This would contribute to greater prosperity, productivity, and stability. It would also expand the range of vocations available to Canadians. Examples of policies aimed at expanding the value-added diversity of Canada's economy included the early National Policy of tariffs to support domestic industry, the Canada-U.S. Auto Pact of 1965, various sector-focused strategies to develop key industries (like aerospace and telecommunications equipment), and limits placed on incoming foreign investment (especially in resource industries).

For some decades after World War II, those strategies seemed to be paying off. The share of Canada's merchandise exports which consisted of unprocessed or barely processed resources declined, eventually outweighed by valuable exports of automotive products, aerospace products, and other technology-intensive, high-value exports. By the 1990s it was no longer accurate to describe Canada as "hewers of wood and drawers of water." Foreign ownership as a share of Canadian GDP also declined (reaching a historic low in the mid-1980s).

Beginning around the turn of the century, however, this historic structural progress in building a more diversified, developed, and autonomous economy began to unravel. This historic about-face is illustrated vividly by the dramatic U-shape of Figure 1. It calculates the share of total Canadian merchandise exports accounted for by four primary sectors: agriculture and fishing, forestry, minerals, and energy. That share declined steadily during the postwar era,

Figure 1
Reliance on Primary Exports

Source: Author's calculations from Industry Canada, Strategis database. Primary sectors include agriculture and fishing, forestry, mining, and energy.



[1] See Watkins (1963) for the classic statement of the dangers of the "staples trap." The commentaries compiled in Stanford, ed. (2014) reflect on the lasting relevance of this analysis for Canada's present economic juncture.

and by the end of the twentieth century (famously defined as "Canada's Century" by Sir Wilfred Laurier) barely one-third of Canada's total exports originated in these basic resource-dependent sectors. That year Canada ranked as the fourth largest assembler of motor vehicles in the world – an astounding achievement for a country of our size. We punched above our weight in several other high-value, technology-intensive sectors as well. Business innovation (measured, for example, by business R&D spending as a share of GDP) reached its highest level ever. It seemed that Canadians were poised to escape our resource-dominated history.

But after 2000, all that progress was reversed, and dramatically. World commodity prices surged, whetting the appetites of investors for Canada's resource riches – especially for our petroleum. At the same time the prospects for Canada's value-added industries dimmed, for various reasons. The 9-11 terrorist attacks produced a short-lived recession in the U.S., and a more lasting change in national consciousness there (including a thickening of the Canada-U.S. border, and a renewed "America-first" attitude on the part of political leaders). Companies which had led the way in Canada's value-added transformation (from North American-based automakers to Northern Telecom) faltered. The take-off of the Canadian currency (which appreciated by 65 percent in five years, beginning in 2002) made Canadian-made products and services fantastically expensive in the eyes of the rest of the world. Foreign capital surged back into Canada; an unprecedented frenzy of takeovers of iconic Canadian firms (Stelco, Inco, Falconbridge, Alcan, Algoma, IPSCO, and more) added a stunning $112 billion to the stockpile of foreign direct investment here in just two years (2006 and 2007). But once the commodity price cycle turned down (as it inevitably does), most of those takeovers went sour.

Today those four primary sectors (agriculture, forestry, minerals, and energy) once again account for a clear majority of total merchandise exports, and the qualitative regression in the composition of our exports is continuing. In essence, Canada has "undeveloped." Much like a Third World country (although, to be sure, with more income, more democracy, and more productivity), Canada is once again primarily reliant on extracting resource wealth from the ground beneath our feet. We export that wealth to others who transform it, manipulate it, and add value to it – importing it back in the forms of advanced products and services.

Table 1
Canada's Economic Complexity Score 1980-2010

	Score	Ranking
1980	1.731	6
1990	1.066	21
2000	1.112	21
2010	0.760	29

Source: Observatory of Economic Complexity, MIT, http://atlas.media.mit.edu/rankings/country/.

An interesting project based at Harvard University, called the Economic Complexity Observatory, tries to quantify the level of complexity and development of different countries, on the basis of a composite measure of each country's exports, imports, production, and technology. Canada's absolute score and relative ranking on this index have both plummeted, as summarized in Table 1. The rapid expansion in petroleum extraction and export is not the only factor in this trend.[2] But it is clear that growing dependence on raw resource extraction is reshaping Canada's entire economy, and reducing our stature in the world as a source of knowledge, innovation, and productivity.

Should we worry about the visible deindustrialization and growing resource-dependence of Canada's economy? I think we should. While there are many immediate opportunities created from resource-driven expansion, there are many risks and costs, as well. These include:

- A stunted role in world trade: Canada is becoming pigeon-holed into supplying raw resources to other countries, to the detriment of other value-added activities (like manufacturing and tradable services).

[2] The successful industrialization of many emerging market economies in recent years is another factor which has affected the relative complexity of Canada and some other OECD countries. But the fall in Canada's relative ranking has been relatively steep; in 2010 Canada ranked by far the lowest of any G7 economies according to this measure, and within the lowest quarter of all OECD countries.

- Perpetual economic uncertainty, with regions and even the entire national economy held hostage to the inevitable ups and downs of resource prices and profits.
- Poor innovation and productivity performance associated with the growing concentration of economic activity in resource extraction, and the corresponding decline of manufacturing.
- Massive costs, usually subsidized by government, of economic infrastructure required for resource extraction and export (including railways, ports, and pipelines). This expensive infrastructure becomes a sunk cost which in turn compels even faster extraction and export of resources to amortize their heavy costs.
- An unbalanced political culture, in which super-profitable resource companies are able to exert disproportionate influence over economic and social policy.
- Growing influence for foreign companies, which have invested huge amounts of capital in resource extraction and export and which wield tremendous influence as a result.
- The environmental consequences (both local and global) of irresponsible management of non-renewable resources. Chief among these concerns today, of course, is the threat of global climate change. Canada's petroleum boom holds major consequences for our national role in addressing this top-priority issue.

In light of these risks and drawbacks, it would be prudent for Canadians to consider whether we are managing the exploitation of our resource wealth in the best way possible. Yes, resource industries are important. They have always been crucial sources of jobs and incomes for Canadians, and they will always play a central role in Canada's economy. After all, all economic activity begins with the necessary raw materials and inputs we harvest from nature. But we need to perform that work in a more deliberate, strategic, responsible, and sustainable manner. Instead of confining our national economic destiny to simple extraction, we need to emphasize and develop our capacity to add value to our own resources. We need to see resource extraction – sustainable and responsible – as just the first step in the value-added chain, rather than as the all-consuming goal in its own right.

We can leverage more Canadian jobs both "upstream" (through more Canadian-sourced inputs to resource projects) and "downstream" (through more Canadian refining, processing, and manufacturing of our produced resources). But this will only happen on the strength of deliberate strategies to link petroleum production to value-added activity. We need a national energy strategy to redirect energy production to meeting the needs of Canadians, and leverage those upstream and downstream value-added opportunities – instead of focusing on the extraction and export of raw energy. At the same time, we also need proactive efforts to manage the economic, fiscal, and environmental side-effects of the resource boom, and to support other Canadian industries capable of producing value-added goods and services for the world market. Those are the major planks of a strategy to reverse the visible regression in our economic structure since the onset of the petroleum boom.

The remainder of this chapter is organized in the following sections. First, we review several empirical indications of Canada's growing and dangerous reliance on raw resource extraction and export, and our resulting national specialization in primary products. Second, we consider some broader risks and consequences of this growing resource-dependence: including stagnant productivity and innovation, future economic instability, and environmental

degradation. Third, we consider in detail economic evidence regarding the negative spillover effects of the petroleum boom (experienced largely through an over-valued exchange rate) onto non-resource export industries. This phenomenon is commonly called "Dutch disease," but I will argue for a different terminology. Finally, the article concludes with some preliminary proposals for enhancing the value-added linkages and spin-offs associated with Canada's petroleum industry.

Describing Canada's Lopsided Trajectory

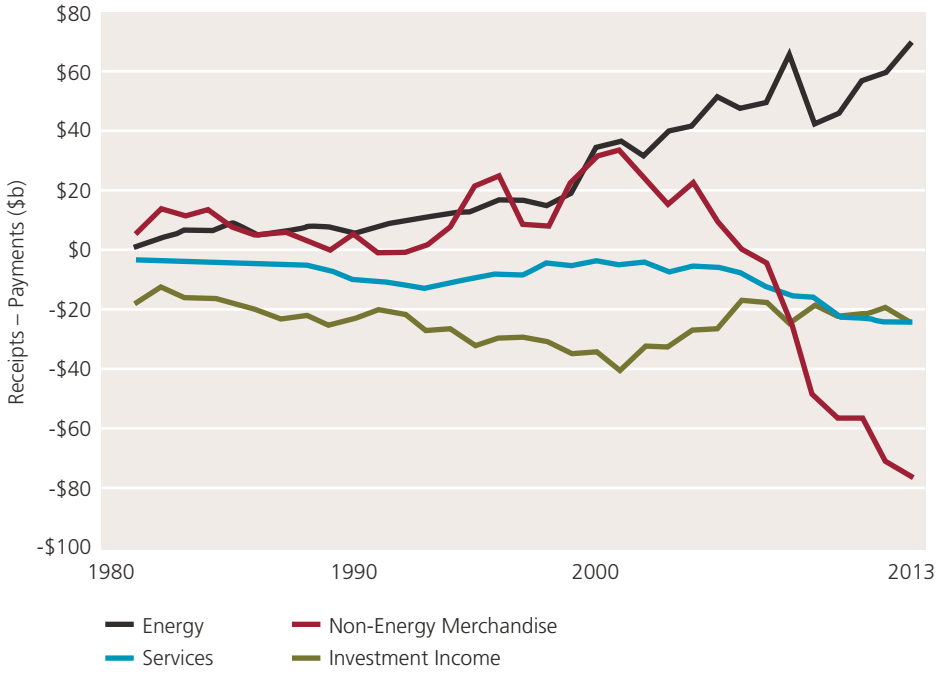
Canada's worrisome reliance on extraction and exports of unprocessed resources (and especially petroleum) is visible in a wide range of statistical indicators. Together they paint a clear picture of a national economy that fundamentally shifted direction, both quantitatively and qualitatively, beginning shortly after the turn of the century.

Figure 2 describes a Jekyll-and-Hyde dichotomy in Canada's international trade performance. Since 2002, when the petroleum boom took off, Canada has enjoyed a large and growing trade surplus in energy products. That surplus reached almost $70 billion in 2013, an all-time record. This should underpin robust success in our international affairs, right? Wrong. Unfortunately, Canada's trade performance in all non-energy products has deteriorated even more rapidly than our petroleum exports have grown.

Canada also enjoyed a trade surplus in non-energy merchandise until 2005. In other words, until then Canada's export portfolio was very diversified, generating positive net export earnings across the whole range of goods we produce (both energy and non-energy). But the two lines diverged when the energy export boom kicked into high gear. Canada quickly slid into a deficit in non-energy merchandise, and that deficit grew steadily – reaching a record of $76 billion in 2013. In short, the more energy we export, the less of everything else we export. That worrisome side-effect of our growing resource-dependence cannot be ignored.

Figure 2
Major External Balances

Source: Author's calculations from Statistics Canada CANSIM Tables 376-0107 and 376-0101.



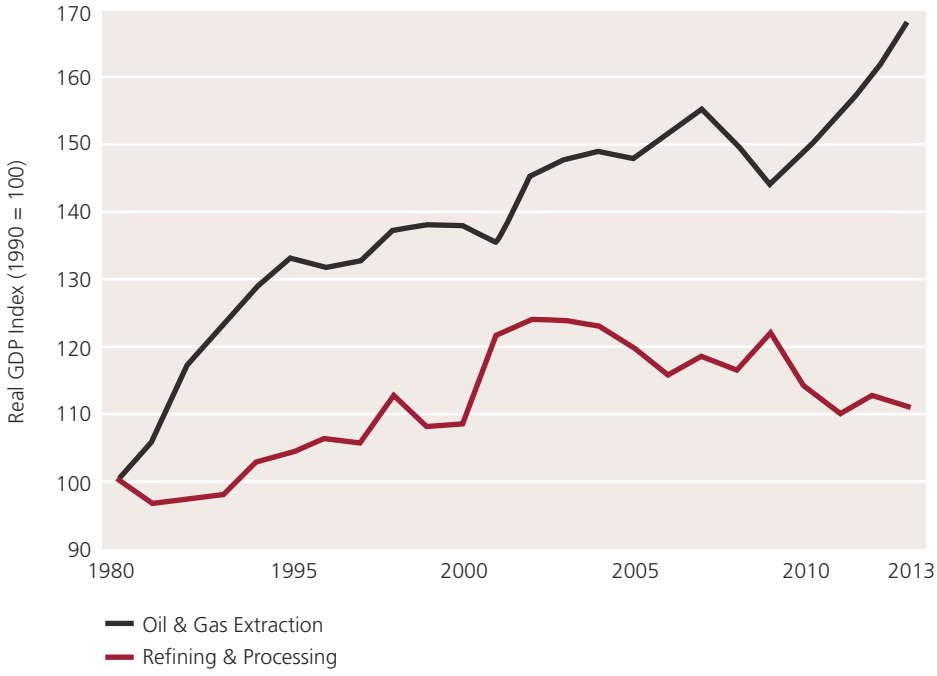
The other components of our international balance of payments remain firmly in the red as well. Our trade deficit in services reached $25 billion in 2013. It is not unusual for Canada to have a trade deficit in services, but it was traditionally quite small. Since 2002, however, our trade performance in services (which are often heralded as the "next frontier" of globalization) has deteriorated dramatically. This is partly due to the dramatic increase in the Canadian dollar, which makes Canadian-made services seem very expensive to foreign customers. Net outflows of investment income (resulting in part from the growth of foreign investment in Canada) produce another chronic drain on the national balance of payments. Put it all together, and Canada has been experiencing a large and now-chronic deficit on its balance of payments that has totalled around $60 billion in recent years. Whereas we once were able to successfully export both resources and value-added products to the rest of the world, our capacities have become increasingly concentrated in resources (especially energy). Even our huge trade surplus in energy products is not enough to offset growing deficits in non-energy merchandise, services, and investment income. We are learning the hard way that we need more than oil to pay our way in world trade.

Even within the broad category of energy exports, Canada's trade has become deindustrialized as we move further and further toward the low-value end of the economic continuum. Most petroleum-producing jurisdictions, in an effort to capture more of the value-added potential of their non-renewable resources, invest heavily in developing upgrading, refining, and petrochemical capacities. Typically, strong policy interventions are used to expand this value-added activity: for example, through requirements for domestic processing, limits on exports of unrefined resources, the use of fiscal subsidies to encourage downstream investments, and even the direct allocation of public equity capital to refining and petrochemical projects. Even in Canada this has been a traditional priority – for example, as with Alberta's effort to nurture a domestic petrochemical industry in the 1970s. In recent years, however, the importance of adding downstream value to our petroleum production has largely faded from the radar screens of policy-makers. Petroleum companies are now given free rein to export the energy they produce in any form. Indeed, the integrated global producers that account for a large share of Canadian petroleum output naturally prefer to refine their feedstock in their own refineries (often located in the U.S.). In this way, corporate decisions regarding what is cheapest or most profitable can easily diverge from broader cost-benefit calculations about what produces most value for Canada.

As a result, the refining and petrochemical end of Canada's petroleum business has lagged far behind the extraction end. In fact, by some measures there has been no growth in petroleum refining and processing at all – in sharp contrast to the dramatic expansion in petroleum extraction. Figure 3, for example, indicates the trend of real output (measured by GDP) in oil and gas extraction and petroleum products manufacturing, using 1990 as the base. Extraction has grown steadily and dramatically (up by 70 percent, in real terms, over that period). Initially, in the 1990s, refining and processing activity also grew, but at a much slower pace. With the take-off in global prices (and the Canadian exchange rate) in the early 2000s, however, even that growth was reversed. Real GDP in the petroleum products sector has since declined by 10 percent, even as the extraction boom accelerated. This decline could get worse, given the fragile prospects facing Canadian refineries in several locations (including B.C., Quebec, and Newfoundland), where security of supply and other challenges are jeopardizing their long-run viability. More positively, some new investments are being made in upgrading (largely in

Figure 3
Extraction vs. Value-Added: GDP

Source: Author's calculations from Statistics Canada CANSIM Table 379-0004 and 379-0031.



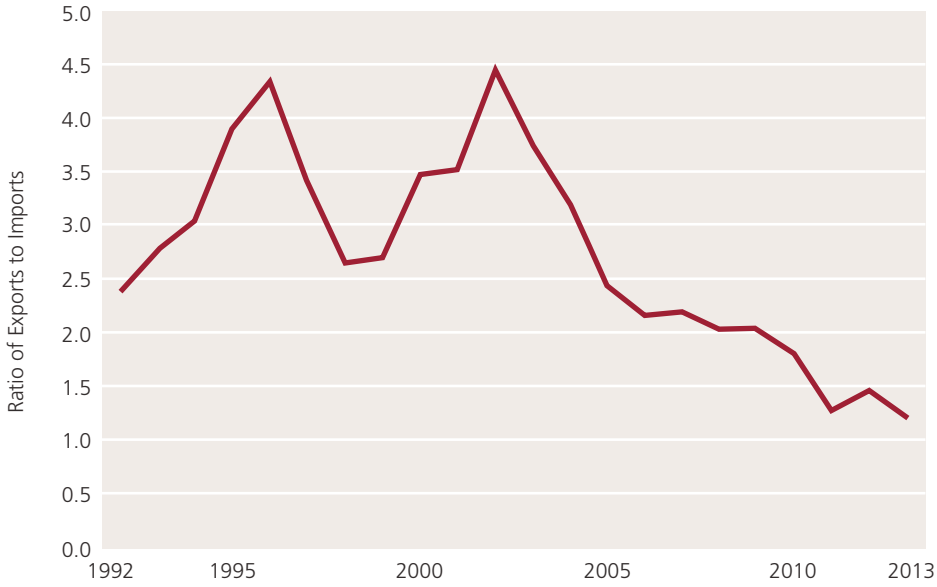
Western Canada), but not enough to reverse the overall trend. Therefore, the stagnation, at best, of Canada's petroleum products sector continues, even as our production of raw petroleum has exploded. This is a damning indicator of the failure of our energy policy to capture the value-added opportunities arising from our own non-renewable resources.

The lack of attention provided to downstream activity in the context of the overall boom is also readily visible in our flagging international trade performance in that end of the business. One would think that, as a leading global petroleum producer, Canada would naturally also be successful in international petroleum products trade. But Canada's status in this regard is increasingly in question. Changes in the regional patterns of energy supply and demand within North America have resulted in Canada becoming a major importer of petroleum products (both from offshore and from the U.S.). Petroleum product imports have exploded five-fold (in nominal dollars) since 2004, mostly destined for consumers in eastern Canada. Canada's exports of refined products, on the other hand, only doubled during the same time (driven solely by higher prices, not increased real output).

The curious result is that Canada now barely exports as much refined petroleum products as it imports, as illustrated in Figure 4. The ratio of exports to imports in this important value-added sector has plunged from over 4-to-1 early in this century, to just 1.2-to-1 in 2013. Relatively minor additional shifts in supply patterns (or, worse yet, the possible closure of one or more Canadian refineries) could easily tip this balance into the red. What an incredible irony that Canada, a dominant source of global petroleum, could soon become a net importer of refined petroleum products. The jobs, incomes, and innovation potential associated with manufacturing our own petroleum, are all given up to foreign suppliers. Meanwhile, as we continue to pump as much unrefined product into foreign markets as possible (for now, only to the U.S.), the earned price of those exports is suppressed by regional supply gluts and the lower quality of the product. The faster we export unrefined product, the lower its price becomes. By focusing so exclusively on extracting and exporting a base product, we dig ourselves into a bigger and bigger hole. We are left needing to exploit increasing volumes

Figure 4
Refined Petroleum Product Trade

Source: Author's calculations from Industry Canada, Strategis database.



of raw resource just to pay for our imports (even imports of products refined from our own feedstock).

It is not just downstream where the failure of Canada to maximize the value-added potential of our petroleum resources is so painfully evident. Upstream too, the lack of attention and creativity of our energy policy is reflected in a growing reliance on foreign suppliers for enormous purchases of lucrative, value-added inputs to the resource industry itself. Too much of the economic stimulus resulting from resource investments leaks out of Canada's economy through imports of machinery, equipment, and supplies. Input-output studies indicate that the dominant supply chain feeding new resource projects in northern Alberta runs north-south, much more than it runs east-west. Too much of the resulting economic stimulus is experienced in the U.S., rather than in Canada (whether that is Alberta or other provinces). For example, according to the Canadian Energy Research Institute, the spin-off economic benefits from bitumen production in Alberta are 5 times larger in the U.S., than in Canadian provinces outside of Alberta (see Clarke et al., 2013, pp. 80-81; and Honarvar et al., 2011). The more we spend on capital equipment and other inputs to petroleum extraction, the more we import, and the bigger our trade deficit becomes.

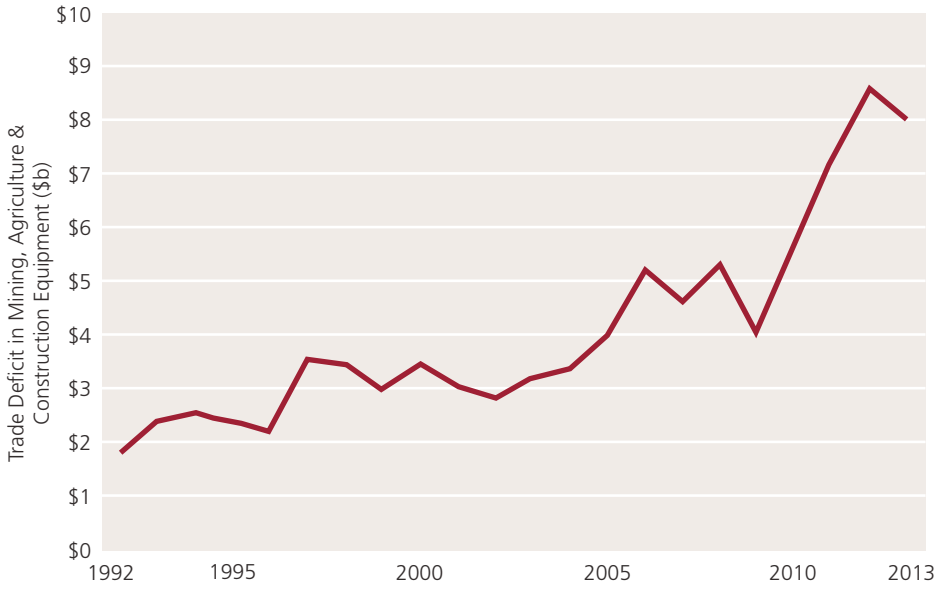
Figure 5, for example, illustrates the dramatic expansion of Canada's trade deficit in construction and mining equipment. Canada has always had an underdeveloped heavy machinery manufacturing sector, but important production facilities here, and a determined effort by policy-makers to expand our footprint in this vital sector,[3] at least kept us in the game. That has all changed. Resource investments have increased Canadian demand for high-cost, high-value heavy equipment. But at the same time, Canadian production of construction and mining equipment has declined – battered by exactly the same forces that have hammered the rest of the manufacturing sector. The resulting gap between demand and domestic supply produces an enormous trade deficit. The deficit in construction and mining equipment alone reached almost $9 billion by 2012, and has roughly tripled since the petroleum boom took off.

Indeed, no better symbol of the weaknesses of the domestic linkages (and the failure of domestic policy to strengthen those linkages) could be provided than the case of Caterpillar.

[3] Economists have long recognized the strategic importance of capital equipment and machinery manufacturing, given its link to domestic productivity, the regional concentration of learning effects and other spill-overs, and the constant innovation and product differentiation which characterize these industries. See Wolfe and Lucas (2005) for more discussion.

Figure 5
Canada's Trade Deficit in Mining Equipment

Source: Author's calculations from Industry Canada, Strategis database.



This U.S. machinery giant sells billions of dollars of equipment to Canadian resource projects. Yet the company closed its only Canadian manufacturing operations in 2012 and 2013. One of these closures generated considerable public attention: the shuttering of its London, Ont., locomotive plant (following a failed attempt to enforce a 50 percent cut in wages on union members there). The other was less reported, but equally ruthless: the closure of Caterpillar's non-union tunnelling equipment factory in Toronto (where workers were not unionized, and hence the company did not go through the high-profile charade of demanding large cuts in compensation). These actions have not deterred Canadian resource producers from sending even more business to Caterpillar – and why should this not be the case, if Canadian governments make no effort to connect the dots between Caterpillar's enormous resource-driven business, and the company's own manufacturing activity here. Being host to many large resource projects should give Canada a "home market advantage" in developing and producing capital equipment tailored to the unique requirements of our resource sector. But without a deliberate strategy, this opportunity will be wasted, and our reliance on foreigners to do this expensive, innovative work will only continue.

In short, both upstream and downstream, it is clear that Canada is squandering unique opportunities to lever our resource wealth into a more well-rounded form of economic development. Even within the resource sector itself, we are ignoring obvious openings to stimulate more made-in-Canada production (both producing valuable inputs to resource projects, and processing and manufacturing our own resources once they are pulled from the ground).

The Risks of Resource-Dependence

The evidence is clear that Canada's economy, and Canada's international trade, is becoming increasingly concentrated in the extraction and export of unprocessed resources – and that the take-off of the petroleum industry beginning around 2002 has accelerated that process dramatically. There are many reasons why this growing concentration should concern Canadians, and why policy-makers, instead of uncritically

celebrating this boom for its immediate economic benefits, should consider ways to manage and plan the expansion, and support as much Canadian value-added as possible.

For example, Canada's national business innovation performance has long been a source of national and international concern.[4] And Canada is getting worse in this regard, not better. Business investment in research development has declined by one-third as a share of GDP since the turn of the century – even as the petroleum boom was gathering momentum. The private sector invested just 0.8 percent of GDP in R&D in 2013 (down from 1.3 percent in 2001). That's the lowest R&D intensity since Statistics Canada began collecting these data. Canada now badly underperforms other industrial countries (and even some emerging market economies) in R&D spending, and the decline in R&D spending (relative to GDP) has been bigger in Canada over the last decade than in any other OECD economy. In other words, our innovation effort and performance has been deteriorating, even as the importance of innovative capacity to long-run productivity and competitiveness is increasingly recognized.

The petroleum-driven structural change in the Canadian economy has been an important part of the deterioration of overall innovation performance during the last decade. Petroleum companies and other resource-extraction businesses do conduct R&D, but significantly less as a share of the industry's GDP than the rest of the economy. Hence, the expanded relative importance of extraction activities will automatically be associated with a decline in overall innovation effort. The related contraction of the manufacturing sector (discussed further below) has a similar effect, since manufacturing is the strongest source of R&D spending. The manufacturing sector in Canada typically invests around 4 percent of GDP in R&D activity, versus only 0.6 percent for the petroleum and mining industries, so a reorientation of Canadian economic activity from manufacturing toward resource extraction will inevitably produce poorer R&D outcomes. That lack of innovation, in turn, then reinforces our economic reliance on the straight extraction of raw resources (since the less we invest in innovation, the less competitive we are in international trade in value-added products).

The impact of the resource boom on national productivity performance is another drawback of our growing dependence on the extraction and export of raw resources. Productivity in resource extraction tends to decline over time, as the most readily available reserves of desired minerals are harvested first – requiring more capital and labour effort to exploit less lucrative deposits.[5] This effect can be offset to some extent by progress in extraction technologies. The tremendous effort (including expenditure of energy) required to extract bitumen is an extreme example of this fundamental "Ricardian" problem in resource industries. Since the turn of the century, Canada's labour productivity has grown at the anemic rate of 0.6 percent per year: putting us 29th among the 34 countries of the OECD, with less than half the average rate of productivity growth in the industrialized world. Resource extraction is certainly profitable (especially when global commodity prices are high), but its productivity declines over time – and this poses significant long-term economic risks to any country which places a growing share of its economic eggs in this particular basket. So as the composition of the economy shifts in favour of resource industries, each of which experiences diminishing returns, overall composite productivity performance suffers accordingly.

The unplanned, "gold rush"-like approach to investment in new resource projects (especially in northern Alberta) further undermines productivity. Mammoth, helter-skelter capital spending, with little attention paid to infrastructure, bottlenecks, and labour supply planning, regularly

[4] See Council of Canadian Academies (2013) for a useful overview of the evidence and causes.

[5] See Stanford (2011) for more discussion of this relationship between resource extraction and productivity.

produces huge cost overruns and other problems in those new projects, and negative outcomes in terms of realized productivity.

Research by Sharpe (2013) confirms the negative impact of growing resource dependence on national productivity. Average labour productivity in mineral and oil and gas extraction has been declining since the turn of the century at the rapid pace of over 5 percent per year, giving this sector the dubious distinction of making the largest negative contribution to Canada's overall productivity performance. The growing share of national output accounted for by pure extraction activities thus has been an important factor in Canada's miserable overall productivity record.

Undue reliance on the export of unprocessed commodities also poses substantial risks to the national economy, in the event of negative shifts in global demand, technology, or prices for those particular products. Indeed, the past history of Canada's staples-driven economic development features many examples of industries (and regions) wiped out by changes in global demand for the products concerned. In some cases the staples industry disappeared because of the exhaustion of supplies. But in other cases the decline reflected changes in foreign technology and tastes, which undermined demand for the staple export in ways over which Canada had no control – then necessitating a painful restructuring.[6] To take a vivid example, Canada no longer exports beaver pelts, and not because we ran out of beavers. Rather, foreign demand for the product disappeared due to changes in taste and technology. Foreign appetite for our other staple exports, including petroleum, is equally unpredictable. For many reasons (technological, environmental, and geopolitical) the strength of global demand for Canada's petroleum output cannot be taken for granted. This risk is not eliminated by merely trying to diversify the destinations of our exports of raw petroleum. Basic prudence would suggest that we should diversify our economic portfolio to reduce the potential damage from future cycles in demand, prices, and activity.

Even business leaders in Canada express concern about the increasingly resource-dependent nature of Canada's economic direction – even though many of those leaders are personally employed in resource-related companies. For example, in a recent survey of CEOs conducted by the Globe and Mail, nearly two-thirds agreed with the statement that Canada is too reliant on commodities, and needs more diversification (Blackwell, 2014). One technology CEO expressed his concern bluntly: "We have become more hewers of wood and drawers of water than we were. There is no doubt in my mind that we have created more risk in our economic environment."

The consequences of the petroleum boom for Canada's international environmental citizenship provide another reason to reconsider the current trajectory. Our resource policies (and, indeed, all economic policy) must now be evaluated in light of our overarching need to limit and reduce greenhouse gas pollution. The environmental problems associated with bitumen production are well-known, including both localized effects (tailings ponds, water pollution, and land reclamation issues) and emissions of greenhouse gases (since bitumen production is itself very energy intensive, it releases more carbon dioxide in extraction and processing than conventional oil). Pressed by regulators and public opinion alike, the petroleum industry has been working to reduce the emissions-intensity of production, but those efforts are being swamped by the dramatic expansion in the sheer scale of production (which some forecasts expect to triple over the next two decades). According to the federal

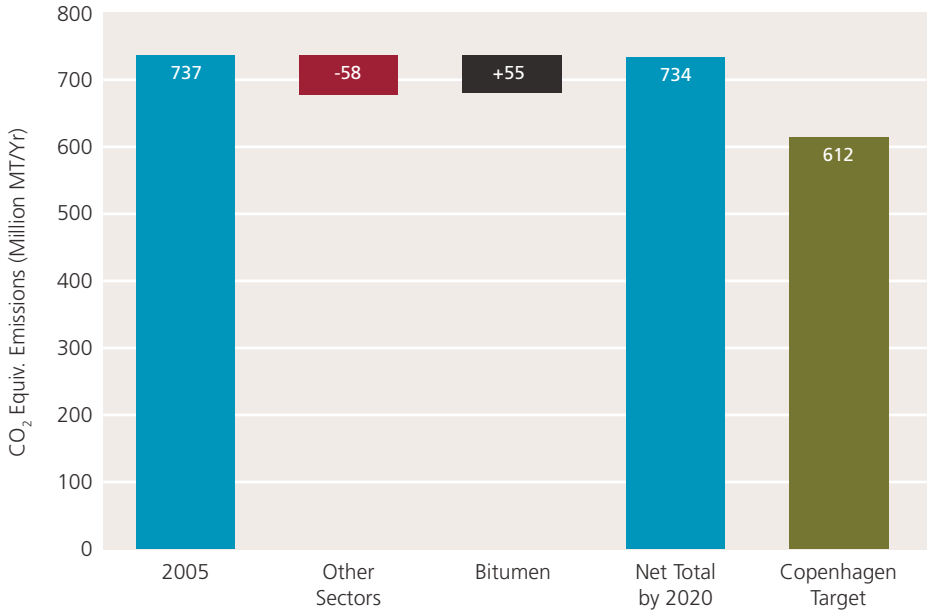
[6] Haley (2011) discusses the dimensions of these risks, and highlights the continuing relevance of this problem – especially regarding environmental factors which will inevitably affect the demand for Canadian energy staples in the future.

government's own forecasts (Environment Canada, 2013), the resulting growth in bitumen-related emissions will almost completely offset the decline in greenhouse gas emissions achieved from all other sectors in Canada from 2005 through 2020 (see Figure 6). That will leave Canada far away from its stated Copenhagen commitments. The rapid expansion of bitumen production is by far the largest single source of new greenhouse gas emissions in Canada. Unless offset by dramatic reductions in emissions from other sectors (something that is far-fetched in the absence of any binding national climate change targets), environmental constraints will inevitably curb future growth in petroleum output and hence threaten the value of sunk capital. Even financial investors are becoming more cognizant of the environmental limits on future bitumen extraction (see, for example, Leach 2014).

It is clear that the sheer physical quantity of resource extraction, and bitumen production in particular, will need to be constrained by the need to limit greenhouse gas pollution. So if the quantity of resource extraction necessarily will be limited, it becomes all the more important to ensure that Canada's economy derives the most benefit possible from the limited volume of resources which can be produced. This reaffirms the emphasis on maximizing the value-added opportunities associated with resource extraction – both upstream and downstream.

Figure 6
Wasted Opportunity

Source: Author's calculations from Environment Canada (2013), p. 21, 24.



Diseases: "Dutch" and Others

Canada's deteriorating value-added performance is not solely due to our failure to maximize the value-added spin-offs that could have been associated with the growth in resource extraction. The damage to our value-added potential goes further, because that resource boom itself has indirectly and inadvertently damaged the prospects of other value-adding sectors of the economy. In other words, not only are we failing to maximize the spin-off benefits to value-added industries from the resource boom, we are also failing to mitigate the collateral damage from the resource expansion to other sectors which do contribute to Canada's economic productivity, diversification, and innovation.

The most important channel for this negative collateral damage on other tradable industries has been through the exchange rate. For various reasons, the rapid expansion in petroleum production and export was associated with the dramatic appreciation of the Canadian dollar, also beginning in 2002. That badly undermined Canadian production and exports of non-resource tradable products – including manufacturing, of course, but other tradable industries as well (such as tourism and tradable services).

This phenomenon is commonly called "Dutch disease" in popular discourse (so-named by the Economist magazine in 1977 to describe the evolution of the Dutch economy following the discovery of North Sea gas there some years earlier). In my view, that term is more confusing than illuminating – all the more so in light of the heated debates that have occurred in Canada over this issue in recent years. Indeed, the Dutch and Canadian experiences with deindustrialization were very different – not least because the downturn in Dutch manufacturing exports that followed the North Sea discoveries was modest and temporary, compared to the more dramatic and long-lasting erosion of Canada's manufacturing sector. I prefer a more descriptive phrase, "resource-led deindustrialization," to refer to the phenomenon whereby value-added industries are crowded out by a resource boom. There are many potential channels for this effect,[7] but the impact of resource extraction and export on the exchange rate is clearly the most important.

The composite hypothesis of resource-led deindustrialization depends on two distinct sub-hypotheses. First, it needs to be shown that the expansion of natural resource exports (and petroleum in particular) pushes up the value of the exchange rate. Second, it needs to be shown that exchange rate appreciation in turn causes contraction in the scale of production and export of non-resource-based tradable industries – including, but not limited to, manufacturing. Other tradable industries affected by exchange rate appreciation include services exports and tourism. Both of these propositions would seem relatively common-sense and uncontroversial when expressed independently. For example, few Bay Street traders would question that the high price of oil, and Canada's growing presence in the global oil industry, was an important factor in the rise of the dollar beginning in 2002. Similarly, few manufacturing analysts would question that the dramatic rise in the dollar had something to do with the accelerating decline in Canadian manufacturing activity, output, and exports. In neither case does the causal relationship need to be exclusive: that is, other factors may also contribute to the rise in the dollar and/or the contraction of manufacturing. To sustain the hypothesis of resource-led deindustrialization, we merely need to accept that both factors are relevant.

Put these two seemingly innocuous sub-hypotheses together, however, and the explosive political implications begin to distort the nature of analysis and discourse. Suggesting that the expansion of an export-oriented petroleum industry (concentrated in the west of Canada) has anything to do with the troubles of manufacturing (concentrated in central Canada) raises uncomfortable questions and conflicts. Some economic and political commentators would rather not talk about the issue at all.

For example, when former Ontario Premier Dalton McGuinty and Federal NDP leader Thomas Mulcair independently suggested in 2012 that Canada's manufacturing industry was experiencing negative side-effects related to the speed and scale of the resource expansion, they were met with a daunting and highly-politicized reaction. Both were accused of being

[7] If capital and labour markets were constrained on the supply side, then a resource boom could crowd out other sectors simply by bidding up the price of those inputs and facilitating their reallocation away from other sectors. That type of restructuring would hardly be a problem, however, since owners of capital and labour (even in declining sectors) would experience rising incomes, and no difficulty finding alternative employment. In Canada's recent experience, it is clear that neither employment nor investment are constrained by supply, and the impact of the resource expansion on other sectors has been experienced through other, less benign channels.

unpatriotic and divisive. Both were vilified by financial columnists (especially, but not exclusively, those in Western papers). Ontarians were told to stop blaming Albertans for their problems (as if such a simplistic us-against-them counterpoint was the essence of the argument). McGuinty and Mulcair moved to defuse the storm, largely retracted their comments, and the lesson was made clear: there is little political space in mainstream dialogue in Canada to even suggest there is any economic downside whatsoever to untrammeled resource expansion. One commentator (Cross 2013b) went so far as to declare (perhaps prematurely) the demise of the whole theory: "The notion of Dutch disease (that a booming resource sector leads to a higher exchange rate that depresses manufacturing) has been so dis-credited even politicians shy away from its use." It is likely true that politicians, given the experience of McGuinty and Mulcair, do indeed shy away from invoking this concept. But that hardly proves that their argument is wrong.

I have reviewed a dozen recent published studies examining the link between the petroleum export boom and the decline of manufacturing in Canada since 2002. I consider what each study says about each of the two sub-hypotheses described above: the impact of the petroleum boom on the value of the Canadian dollar, and the impact of the higher Canadian dollar on manufacturing activity in Canada. The findings of this review are summarized in Table 2.

Table 2
Previous Research on Resource-Driven Deindustrialization in Canada

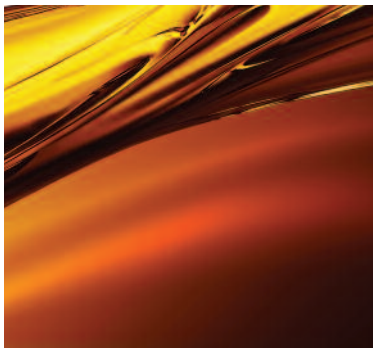
Source: Adapted from Clarke et al. (2013), pp. 73-87.

"n.a." indicates that the source in question did not address this issue.

Source	Link Between Oil Price / Oil Expansion and Appreciation of $C?	Link Between Appreciating $C and Decline of Canadian Manufacturing?
Bank of Canada (2012)	✔	✔
Beine et al. (2009)	✔	✔
Burt et al. (Conference Board, 2012)	n.a.	n.a.
Clarke et al. (CCPA, 2013).	✔	✔
Cross (Macdonald-Laurier, 2013)	✔	✖
Honarvar et al. (CERI, 2011)	n.a.	n.a.
IMF (2013)	✔	✔
Lemphers and Woynillowicz (Pembina, 2012)	✔	✔
OECD (2012)	✔	✔
Shakeri et al. (IRPP, 2012)	✔	✔
Spiro (Mowat, 2013)	✔	✔
Tal and Exarhos (CIBC, 2014).	n.a.	✔

Not every one of these published works comments explicitly on each of the two links in the logical chain required to sustain the composite deindustrialization hypothesis. For example, two much-reported studies estimating the spin-off benefits of bitumen investments for other regions and other industries in Canada (Burt et al. 2012, and Honevar et al. 2011) make no commentary on either of those two issues. Instead, these two studies each utilize a fixed-coefficient input-output model (benchmarked to Statistics Canada's 2006 input-output matrix for Honevar et al., and 2008 for Burt et al.) to track through the indirect effects. This approach assumes fixed relative prices and a fixed exchange rate. Neither of these reports, therefore, can shed light on whether or not the resource boom has had any negative side-effects on the competitiveness, and hence output, of those other sectors.[8]

[8] Moreover, both of those studies find the interprovincial and intersectoral stimulus from major bitumen investments to be surprisingly small, and much smaller than the spin-off spending generated in the U.S. economy by those investments. See Clarke et al. (2013), Appendix 1, for a more detailed discussion.



Of the other studies listed in Table 2, all but one confirm that the run-up in oil prices, and the corresponding expansion of investment, production, and exports in Canada's petroleum industry, has been a significant factor (not necessarily the only factor) in the sharp appreciation of the Canadian dollar since 2002. The only exception is the work of Tal and Exarhos (2014), who did not attempt to explain the causes of the dollar's appreciation, but rather focused only on its consequences.

Regarding the second sub-hypothesis, all but one of the remaining studies (again, other than the two input-output models) also confirmed that the appreciation of the Canadian dollar was a significant factor (again, not the only factor) in the contraction of Canadian manufacturing. The only exception in this case was the report by Cross (2013a), who, surprisingly, actually denied that any such contraction in manufacturing has, in fact, occurred. Cross measured the size of the manufacturing sector on the basis of nominal sales (rather than more conventional measures such as real value-added or employment), and concluded that overall manufacturing output was stable through the decade of Canadian-dollar appreciation (with sectors enjoying growing sales offsetting those experiencing falling sales). On this basis, Cross concludes that deindustrialization has not occurred.[9] He is the only author among the twelve surveyed to argue that manufacturing has not declined. Most other analysts would conclude from the loss of employment (down by 600,000 positions in Canada since 2001) and real value-added (which declined 14 percent between 2004 and 2013)[10] that manufacturing has indeed experienced a contraction.

The strong majority of research surveyed and summarized in Table 2, therefore, confirms both sub-hypotheses in the theory that the petroleum boom, primarily through its impact on the exchange rate, has indeed had a negative impact on manufacturing (and other tradable sectors, as well). Research confirms that the rapid expansion of petroleum production and export has been a major factor in the appreciation of the dollar, and also that the stronger exchange rate has predictably undermined investment and export opportunities in other trade-sensitive sectors. Only one cell in the matrix depicted in Table 2 (namely, Cross's argument that the high dollar has not damaged the manufacturing sector, which has enjoyed stable aggregate nominal sales) reflects the presence of counter-evidence to either of the two sub-hypotheses embedded in the composite hypothesis of resource-driven deindustrialization. Eight of the twelve studies confirm both links in that logical chain, two confirm one of the two links, and the remaining two (the input-output studies) do not comment on either link.

Published economic research, therefore, confirms that the resource boom has had an important set of unintended side-effects on the well-being of other sectors in Canada's economy. This hardly implies that the petroleum industry should somehow be vilified or "shut down." Instead of pretending that these unintended side-effects do not exist (or, worse yet, suggesting that it is somehow "un-Canadian" to even discuss them), surely it is more effective to recognize that there are both costs and benefits to the petroleum boom. The expansion of petroleum extraction and export has created potential and opportunity, but also risk and challenge. The goal of policy should be to actively enhance the benefits and reduce the costs of this fundamental change in Canada's economic structure, thus achieving a higher net benefit outcome for Canadians. Efforts to enhance the Canadian value-added associated with resource developments (both upstream and downstream) would certainly constitute one important component of such a policy framework.

[9] The use of nominal sales as a measure of total industry output is questionable given the impact of inflation on nominal values. Two of the most resilient sub-sectors identified by Cross (food manufacturing and petroleum refining) were also the ones experiencing the fastest nominal inflation, which should not be misinterpreted as evidence of "growth" in any real sense.

[10] In 2000 manufacturing accounted for 16 percent of Canada's GDP at factor cost; by 2013 that had declined to 10 percent. While manufacturing tends to decline gradually as a share of GDP in the industrialized countries, the decline in Canada has been much faster since 2000, and to a lower level, than in other OECD countries. And in Canada there has also been a decline in absolute real manufacturing output which has not been experienced in most other OECD countries.

The precise "transmission mechanism" linking the petroleum boom to the exchange rate merits further discussion. Casual observers might assume that the impact is experienced through a generalized improvement in trade performance (measured by the current account balance), driven by vibrant petroleum exports. But this is clearly not the case. As noted above, Canada's overall trade balance has deteriorated markedly in the last several years, and remains mired in a deep and chronic deficit. Including services and investment income, Canada's current account deficit now regularly exceeds three percent of GDP (leading to an annual accumulation in international indebtedness of equal proportion).

The link between petroleum and the exchange rate is not experienced through trade flows, but rather through capital and asset markets.[11] Part of the effect is due to fleeting speculative capital flows, as financial traders internalize (rightly or wrongly) the assumption that the Canadian currency is a "petro-dollar," and hence determine their speculative positions in light of their expectations of changes in petroleum markets. This belief can become self-fulfilling, and during periods of exuberant expectations it can push the dollar far higher than real fundamentals would justify. The transmission mechanism between the petroleum boom and the Canadian dollar is also experienced through longer-run capital inflows associated with the growth of foreign direct investment in Canada's oil patch. The historic surge in incoming FDI (focused on resource-related industries) in 2006 and 2007 was associated with the most dramatic upswing in the dollar. Continuing foreign investment in the oil patch[12] has reinforced this overvaluation.

Canada represents a rare opportunity for private energy companies to invest in new sources of petroleum supply, since over 80 percent of the world's oil reserves are owned by state-owned enterprises, and over half of the remainder is located in Canada (see Hussain, 2012). This unique private access to a strategic non-renewable resource is another factor explaining the intense interest by foreign investors in ownership of Canadian petroleum assets. A better understanding of the precise ways in which the petroleum expansion translated into a rising Canadian dollar can also inform policy responses to the problem. For example, if incoming FDI interest is a key factor supporting the dollar at high levels despite Canada's large and accumulating current account deficit, then limits on foreign takeovers of resource assets and resource companies would help to break that link and presumably facilitate a softening of the dollar. The fact that the Canadian dollar declined significantly in 2013, following the announcement by the federal government of new limits on foreign state-owned ownership in the bitumen industry, is consistent with this hypothesis.

The reversal of the Canadian dollar through 2013 and 2014 reduced its value by over 10 percent compared to the U.S. dollar. But even at reduced levels (in the range of 90 cents U.S. at time of writing) the dollar's retreat is incomplete. According to the Organization for Economic Cooperation and Development, the purchasing power parity equilibrium level for the Canadian dollar is 81 cents (U.S.).[13] Even at 90 cents (U.S.), therefore, the exchange rate is still approximately 10 percent too high (and still making Canadian-made goods and services appear 10 percent too expensive in global markets). However, even this partial reversal will eventually enhance the competitiveness of non-resource exporters (with an expected time lag[14]) and lead to some improvement in non-resource trade performance. Even resource exporters benefit from a lower dollar (since it enhances the landed value of export earnings). This partial decline in the dollar reflects a negative shift in investor expectations about

[11] Economists have long recognized that the exchange rate is a primarily financial variable, not predictably determined by factors in the real economy.

[12] A recent estimate suggests that foreign investors own over 70 percent of the equity in Canada's bitumen production, including both Canadian subsidiaries of foreign firms, and foreign minority ownership of Canadian-based bitumen producers. See Forest Ethics Advocacy (2012).

[13] See OECD, "Purchasing Power Parities for GDP," available at OECD.stat.

[14] It typically takes 1-2 years for the effects of exchange rate adjustments to be reflected in production and employment decisions, and even longer for fixed capital spending.

Canada's general economic recovery, the expected "tapering" of quantitative easing by U.S. monetary authorities, the recent softening of global commodity prices (and expectations of future price changes), and a realization by investors that Canada's bitumen expansion faces many risks and constraints (economic and otherwise). The softer dollar will assist many export industries, but it cannot bring back all the non-resource jobs lost during the dollar's upswing. Moreover, many firms will wonder if the dollar might shoot upward again in the future (if and when oil prices strengthen further). Given the inaction of Canadian policy-makers (in government and the Bank of Canada) when the dollar took off after 2002, this is a reasonable concern, and it may serve to inhibit the rebound in investment in manufacturing and other trade-sensitive activities.

Nevertheless, the recent decline of the Canadian dollar has been almost universally welcomed by economic analysts who expect it to have an eventual and significant positive impact on exports (which has been the weakest component of national GDP performance). This is ironic, given the intense debate which erupted when the dollar was high, over whether or not this appreciation had any negative implications for the rest of the economy or not. If resource-driven deindustrialization does not exist, and the high dollar was not the cause of Canadian manufacturing problems, then why do economists now so energetically welcome the dollar's decline?

The erosion of manufacturing in Canada was far faster over the past decade than was experienced in most other OECD countries. It was not inevitable, and has had major negative effects on Canada's productivity, investment, incomes, and exports. Moreover, the decline in other export industries in the era of over-valuation (including tourism and tradable services) shows this is not solely a manufacturing issue. All trade-sensitive industries (including petroleum itself) have been damaged by the sharp currency appreciation which was so clearly a side-effect of the petroleum expansion. Notwithstanding the over-heated political rhetoric that was sparked by the issue, policy-makers should think about ways to ensure that this unfortunate experience is not repeated in the future.

Toward a More Diversified Economy

As a major petroleum producer, Canada is squandering the opportunity to generate additional jobs, incomes, and exports from petroleum production (keeping in mind that the level of petroleum extraction must be managed, as well, in light of both economic and environmental considerations). We need a proactive strategy to maximize forward and backward linkages from petroleum extraction to other value-added sectors. In this way, resource production can support (rather than undermine) broader economic development goals. "Less extraction and more value-added" is a motto which summarizes this philosophy. Applied to the petroleum industry, this approach would feature several key policy measures:

- Active efforts are needed to boost Canadian-content in the machinery, capital, and services which are purchased as inputs to resource projects. Given the enormous capital investments being made in new projects (especially bitumen), the industrial spin-offs to other Canadian sectors have been far from optimal. Capturing those spin-off benefits requires planning and encouragement, rather than simply assuming that a rising bitumen tide will automatically lift all boats.

Sarnia-Lambton Refining and Petrochemical Complex

- Active strategies to maximize industrial spin-offs from resource projects across Canada would also help to overcome the regional inequalities and divisions which are a feature of the current unplanned approach. Potential enmity between resource-producing and resource-consuming regions could be short-circuited quickly by deliberate and effective measures to enhance the purchase of capital equipment and other inputs from other provinces.
- Exports of raw petroleum should be discouraged or limited by regulation. Instead, policy should encourage (or even mandate) more made-in-Canada upgrading, refining, and petrochemical activity, to add as much value as possible to our non-renewable resource – and to avoid driving down received export prices through our own excess shipments of lower-grade bitumen.
- Enhancing the value to Canadians of our own resource also implies investments in infrastructure to allow the matching of Canadian supplies with Canadian end-users. Canada's refining and petrochemical industries face challenging global pressures which threaten the future of important refinery operations in several parts of Canada. Ensuring a secure source of Canadian supply to these crucial facilities would help to preserve these facilities and their high-value jobs, as well as to strengthen Canada's net trade performance in refined petroleum products.
- An ambitious value-added policy for Canada also requires proactive measures to support continued investment, production, exports, and innovation in export-oriented value-added industries that have nothing to do with petroleum. Active industrial strategies to enhance Canada's footprint in key high-value industries (learning from the successful experience of other countries which have followed this approach, like Germany, Korea, and Scandinavia) will be important in ensuring that Canada's resource wealth does not result in an unbalanced economic structure.[15]
- Proactive measures to manage the macroeconomic side-effects of regionally concentrated resource expansion will also be important to improving the net benefits to Canadians from petroleum production. This includes measures to ensure the Canadian dollar remains at levels that are compatible with Canadian competitiveness. Fiscal measures to ensure that the benefits of resource production are shared widely through the country will also be important.

With active attention paid to ensuring that resource industries contribute, rather than detract from, the prospects of other value-added sectors in Canada, our resource wealth could become a stepping stone toward a more diversified, prosperous, and sustainable economic future.

In contrast to this optimistic vision, some proponents of a more narrowly "extractivist" economic strategy actually celebrate Canada's renewed focus on raw resource extraction as an efficient reflection of our natural "comparative advantage." For them, there is nothing wrong with Canada becoming increasingly dependent on the extraction and export of raw resources. Government should not interfere with the drive to extract and export non-renewable resources such as petroleum, since the profit-seeking activity of the oil industry somehow reflects the real benefits and opportunity costs of the various opportunities for using our scarce capital, labour, and ingenuity. Merely extracting the resource, in this world view, is all the "value-added" that we need. For example, Trevor Tombe, an economist at the University of Calgary and author of a recent report celebrating Canada's raw energy exports, made this case

[15] See Stanford (2012) for more discussion of this policy direction.

bluntly: "The value you're adding is in extracting the resource itself. It has no value a kilometre below the surface, but it has value when it's brought to the surface. When you take resources from below the surface and move it up to the surface and ship it to where the demand is, that is creating value." (Smith, 2014). This approach implies that unexploited natural resources are value-less and hence "wasted," and that it is in fact preferable to focus on extraction and to allow other nations to do the work of innovation, engineering, design, and manufacturing required to convert our raw resources into value-added products and services.

Most Canadians would reject this stunted vision for Canada's economic future. Most Canadians immediately appreciate the risks – economic, environmental, geopolitical – of our country becoming a mere source of raw materials for other, more developed economies, who then process those resources and sell us back the (more expensive) finished products. Most Canadians want something bigger for our country: an economy based on talent, innovation, ingenuity, and productivity. I believe that the vision of building a more diversified, value-added economy is one that would generate strong excitement and support. We don't need to throw out any babies with the bath water; we can be grateful for the unique opportunities that Canada's resource wealth provides. But we must be more deliberate and proactive in ensuring we manage that wealth wisely, as a stepping stone to a developed, prosperous, and sustainable economy.

References

Bank of Canada (2012b). "Dutch Disease," Remarks by Mark Carney, Governor of the Bank of Canada, Spruce Meadows Round Table, Calgary, Alberta, 7 September 2012.

Beine, Michel, Charles S. Bos, and Serge Coulombe (2009). "Does the Canadian Economy Suffer from 'Dutch Disease'?", mimeo, University of Ottawa.

Blackwell, Richard (2014). "Tunnel Vision," The Globe and Mail (March 31).

Burt, Michael, Todd Crawford, and Alan Arcand (2012). Fuel for Thought: The Economic Benefits of Oil Sands Investment for Canada's Regions (Ottawa: Conference Board of Canada).

Clarke, Tony, Diana Gibson, Brendan Haley, and Jim Stanford (2013). Bitumen Cliff: Lessons and Challenges of Bitumen Mega-Developments for Canada's Economy in an Age of Climate Change (Ottawa: Canadian Centre for Policy Alternatives).

Council of Canadian Academies (2013). The State of Industrial Research and Development in Canada (Ottawa: Council of Canadian Academies).

Cross, Philip (2013a). Dutch Disease, Canadian Cure: How Manufacturers Adapted to the Higher Dollar (Ottawa: Macdonald- Laurier Institute).

Cross, Philip (2013b). "The Logic Cliff," Financial Post (February 25).

Environment Canada (2013). Canada's Emissions Trends (Ottawa: Minister of the Environment), October.

Forest Ethics Advocacy (2012). Who Benefits? (Vancouver: Forest Ethics Advocacy).

Haley, Brendan (2011). "From Staples Trap to Carbon Trap: Canada's Peculiar Form of Carbon Lock-In," Studies in Political Economy 88, pp. 97–132.

Honarvar, Afshin, et al. (2011). Economic Impacts of New Oil Sands Projects in Alberta (2010–35) (Calgary: Canadian Energy Research Institute).

Hussain, Yadullah (2012). "Oil Explorers' New Challenges," Financial Post, May 3.

International Monetary Fund (2013). "Article 4 Consultation, Country Report 13/40," February.

Leach, Andrew (2014). "How the Oil Sands Could Very Quickly Become Unviable," Maclean's (March 20).

Lemphers, Nathan, and Dan Woynillowicz (2012). In the Shadow of the Boom: How Oilsands Development is Reshaping Canada's Economy (Drayton Valley: Pembina Institute).

Organization for Economic Cooperation and Development (2012). OECD Economic Surveys: Canada (Paris: Organization for Economic Cooperation and Development).

Shakeri, Mohammad, Richard S. Gray and Jeremy Leonard (2012). Dutch Disease or Failure to Compete? A Diagnosis of Canada's Manufacturing Woes (Montreal: Institute for Research on Public Policy).

Sharpe, Andrew (2013). "What Do We Know About Productivity and What is the Best Focus for Future Research?," Presentation to Ontario Ministry of Finance, Centre for the Study of Living Standards, September 30, http://www.csls.ca/news/presentations/OntarioMinistryFinance.pdf.

Smith, Dale (2014). "The Smell O' Jobs," Blacklocks Reporter (March 19).

Spiro, Peter (2013). More Stability Please: A New Policy Approach to Canada's Exchange Rate (Toronto: Mowat Centre for Policy Innovation).

Stanford, Jim, ed. (2014). The Staple Theory @ 50: Reflections on the Lasting Significance of Mel Watkins' "A Staple Theory of Economic Growth" (Ottawa: Canadian Centre for Policy Alternatives).

Stanford, Jim (2012). A Cure for Dutch Disease: Active Sector Strategies for Canada's Economy (Ottawa: Canadian Centre for Policy Alternatives), 11 pp.

Stanford, Jim (2011). "Canada's Productivity and Innovation Failures: Questioning the Conventional View," in The Canada We Want in 2020: Towards a Strategic Policy Roadmap for the Federal Government (Ottawa: Canada 2020).

Tal, Benjamin, and Nick Exarhos (2014). "Canadian Manufacturing: Survival of the Fittest," CIBC Economics In Focus (April 1), http://research.cibcwm.com/economic_public/download/if_2014-0401.pdf.

Watkins, Mel (1963). "A Staple Theory of Economic Development," Canadian Journal of Economics and Political Science 29/2 (1963), pp. 49–73.

Wolfe, David A. and Matthew Lucas, eds. (2005). Global Networks and Local Linkages: The Paradox of Cluster Development in an Open Economy (McGill-Queen's University Press, Montreal and Kingston).

Biography

Jim Stanford is an economist with Unifor, Canada's largest private sector trade union. He received his Ph.D. in Economics in 1995 from the New School for Social Research in New York, and also holds economics degrees from Cambridge University and the University of Calgary. Jim is the author of "Economics for Everyone,"published in 2008 by Pluto Press and the Canadian Centre for Policy Alternatives. He writes an economics column for the "Globe and Mail," and is a member of CBC TV's regular National News economics panel, "The Bottom Line." He lives inToronto with his partner and two daughters.