Canadian Oil Sands Investments: FOCUS on a Controversial Energy Source

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I. Introduction

Canada has always been considered a country of vast natural resources. The large supply of various minerals, endless forests and lumber and the largest fresh water deposits in the world speak for themselves. A country with such varying eco-zones is bound to possess many of the resources of the world. Over the years, Canada has become a major player in the crude oil markets. Recently, it is a strong belief of many that Canada holds the second largest reserves (or potential reserves) of crude oil in the world, following to Saudi Arabia. This point is critical given the importance oil has developed over the years and the volatility and unpredictability of oil markets in recent times.

The rise of developing countries and their emerging markets and the transformation of countries like China and India into industrialized nations explains the exponential growth of demand, not least because these two countries' markets hold approximately one fifth of the world's population. Supply of oil has been fairly stable despite occasional scares, crises, or political issues. Given oil's characteristic as a non-renewable resource, the question of remaining reserves and the research of alternatives to fossil fuels are key political issues.

However, until these alternative energy sources are found and developed, dependency on oil will remain an inconvenient fact. With the advent of the Canadian oil sands projects in Alberta, some forecast large quantities of crude oil as being extractable and helpful in easing dependency issues. Considering all this information about the current happenings with regard to crude oil, many Canadians recognize the importance of the oil sands projects as being beneficial to their national and the global society, as well as giving Canada a vast economic advantage. These points were especially highlighted over the last few years, when the oil price culminated, reaching nearly $145 per barrel.

This paper sets out to achieve various key goals that will help analyze the ideas behind the oil sands projects. The first section is a basic introduction of the topic of crude oil and commodity markets and the interaction of demand and supply in these markets. From here, we continue explaining the specifics of the oil sands geographically and economically as well as taking a look at some of the technical aspects involved in exploring and extraction processes. The third section is devoted more specifically to the real and expected economics consequences of the oil sands on Alberta, the other provinces and Canada as a whole. We intend to use this section to introduce and compare basic economic theories applied to the ideas put forth by the oil sands projects. Our main goal is to make use of the FOCUS model in order to explain the various shocks to the economy that typical oil sands projects put forward. FOCUS model projections will allow us to explain how the oil sands have developed and are expected to develop over a period of 10 years. From this point, it would be of great interest to consider what issues one comes across when using FOCUS to analyze these projects. Although the FOCUS model provides good feedback as to what results from the projects, it is not a complete model and there are some modifications that could be considered in order to better analyze projects of this sort. Finally, we intended to explain some of the important environmental issues that can plague the further development of these projects and offer some opinions and concluding statements.

II. Oil Sands: Technical Aspects

Before one can begin discussing the economic advantages and disadvantages of these projects, it would be beneficial to educate oneself on certain specifics of the oils sands projects. The bulk of the Canadian oil sands deposits are located in Alberta, with some potential but unexplored deposits believed to be in southern regions of Yukon and Northwest Territories. The main oils sands deposits are found below an area of nearly 140,000 square kilometres of land in North-eastern Alberta. Within this vast land, the key points of extraction are in the Athabasca, Cold Lake and Peace River areas of Alberta. It is estimated that there is a potential 1.7 trillion barrels of bitumen in place in Alberta, of which only 315 billion barrels are currently believed to be recoverable.[1]

What the oils sands are exactly, is a combination of clay or sand with water and a very thick form of petroleum known as bitumen, and is considered a 'non-conventional' oil supply. At one point, extraction was a very difficult and exhaustive method. It was believed that it would take more than a barrel of oil's worth of energy put in to extract one barrel of bituminous oil. This is very costly and wasteful. But as time passed, and more importantly as crude oil prices began to increase, more investment was put forward into various oil sands projects, due to the increased potential profitability.

This influx of needed money led to technological developments which simplified the extraction processes, making them more energy and cost efficient. Now there exist various extraction methods each with the trade-off between cost and bitumen recovery rate. For example, Cold Flow technology which simply pumps the oil directly from the sands is the most cost effective, but only recovers up to 7-10% of the oil in the sands, while the Steam Assisted Gravity

[1] Standing Committee on Natural Resources. (Winter 2006) "Chapter 1: The Oil Sands - An Overview."

Drainage (SAGD) method, is more complicated in that it uses various wells set up in stages and injects steam directly into the sands causing the bitumen to melt, becoming less viscous and thus falling into the wells at the lower stages. The recovery rate is upwards of 60-70% but it can get costly relative to the Cold Flow method, although SAGD is quite innovative when compared to other extraction methods. Much of the energy required for extraction comes from burning natural gas. A past problem, as already mentioned, was that the energy got from burning natural gas in order to extract one barrel of oil was more than the energy that one barrel of oil would produce. Over time this process also became more efficient, and currently one barrel of oil produces five times as much energy as is put into the process from burning the gas. With continued innovation, this is expected to reach as much as ten times the energy needed.

As mentioned earlier, this innovation would not have occurred had it not been for the increased investments in the expansive projects throughout Alberta. One of the main motivations behind the increase investment was the sudden increase in crude oil price. However, crude oil price of $100 or more is not necessary for profitability and successful expansion of the oil sands projects. In fact, an average price of around $50 would be sufficient to continue investment growth, and an average price of $35-$40 would still see production but would see a slowdown. Going along with the price is the increased demand globally, and the speculation or belief that world supply may not be able to keep up with demand as it continues to increase. So obviously, there is great interest in discovering new areas to develop and then go forward with extraction in these areas. Another interest in the Canadian oil sands, in particular, is that given the threats and political instability which are currently present in the Middle East countries, African nations and Venezuela, having a large supply of oil coming from a stable country like Canada could ease the minds of all who require a constant flowing supply of oil.

III. Oil Sands: Economic Consequences

The discussion of the impacts of oil sands development starts with expected economic consequences. First, an overview on studies by the industry lobby, i.e. the Canadian Association of Petroleum Producers (CAPP), and an independent research institute, i.e. the Canadian Energy Research Institute (CERI), are featured, as these are fundamental to governmental reports on the issue.[2] Generally, these studies can be seen as optimistic best-case-scenarios, reflecting the industry's strong interest in governmental approval and support of project development. Second, a theoretical discussion using the classical IS-LM framework will follow and lead over to the application of FOCUS, the macro-econometric model projecting the economic consequences on the basis of IS-LM theory.

In their report to the government's Standing Committee on Natural Resources, both CAPP and CERI draw an optimistic picture of the economic consequences of oil sands development for both Alberta, but also particularly for entire Canada. As a matter of fact, reports indicate that future oil sands investments will cause positive shocks not only in numerous sectors of the Canadian economy, but also in numerous provinces. More specifically, CAPP suggests that investments in the oil sands will also positively affect neighbouring industries and therefore create positive externalities in sectors as diverse as business services, manufacturing, retail, finance and insurance. Even though actual investment projects are subject to profitability checks in the future and numbers are thus to be taken with a grain of salt, an impressive $125 billion CAD is to be invested in oil sand related projects in ten years up to 2015.

Positive investment figures are supported by CERI studies on the positive impact of the industrial sector of oil sands on the Canadian economy in total. On the basis of an econometric

[2] Standing Committee on Natural Resources. (Winter 2006) "Chapter 4: Economic Benefits of the Oil Sands."

model, CERI calculates a contribution to Canadian gross domestic product of roughly $800 billion CAD in twenty years of time till 2020. Given the oil sands location in Alberta, the province will profit the most, with approximately 80% of said $800 billion CAD accruing there. Remaining 20% are estimated to be primarily felt in Ontario, with two-third of the residual sum boosting its economy. In total, the industry's share of Canadian GDP is predicted to rise to 3% in twenty years up from 1.5% in 2000.

Rising economic aggregates also imply two additional economic consequences. Firstly, employment is expected to increase in Alberta, i.e. here on actual oil sand extraction sites and in related industries, and in other provinces, i.e. here in supporting industries such as business services and the manufacturing sector. CERI also notes interprovincial migration is likely as workers move to Alberta to profit from higher earnings opportunities. Information on adverse effects on provinces-of-origin is not provided, although higher wages could potentially induce a brain- and muscle-drain to Alberta leaving other provinces short of qualified workers.

Secondly, given profitable oil sands operations in Alberta, governmental revenues are expected to rise accordingly. Primarily, this is since the government of Alberta and Canada collect corporate and personal income taxes, property taxes. Secondarily, royalties are paid by companies to the government of Alberta that holds ownership of the resource. Here, the argument is that investments in oil sands would support governmental budgets. On the other hand, governments are also expected to support development of oil sands projects through improvements of infrastructure and transport networks since the existing could become a limiting factor in future growth. As such, the CERI report is not quite clear on whether the investment in oil sands really is a profitable endeavour from a governmental perspective.

IV. Oil Sands: Theoretical Considerations

In the section above, governmental reports based on studies by CAPP and CERI on the economic consequences of current and future investments in oil sands projects were presented. Here, the implementation of those shocks in the FOCUS model is discussed. Said model is a medium-sized econometrical model developed and maintained by the Institute for Policy Analysis at the University of Toronto. Its theoretical fundament is the IS-LM-model of a small open economy with flexible exchange rates, i.e. the Mundell-Fleming-model.

The FOCUS model calculates projections of the performance of Canada's economy using user-input shocks. In other words, its equilibrium steady-state depiction of the Canadian economy is destabilised and the model reports yearly estimates of economic indicators on its way back to long-term equilibrium. Although the classical IS-LM model does not allow for the same detail on shocks as the FOCUS model does, a short overview over expected theoretical results allows for later plausibility-checks of FOCUS results. This overview is depicted in the appendix, see Graph 3. In the following, no changes in money supply through central bank policy are assumed (M/P is fixed), as this is also the case in the FOCUS simulation. Furthermore, the economy is assumed to be in an equilibrium state producing the natural, i.e. long-term, level of output at the long-term level of unemployment (IS=LM and AS=AD). While this is a strong assumption, it simplifies reasoning and solving of the theoretical model without leading to false predictions.

Assuming a positive shock in investments (I↑) and a subsequent positive shock on exports (X↑), the goods-market curve, i.e. the IS-curve, shifts up. In Graph 3, this is explained through increasing demand on the goods market. This expansive shock leads to an increasing interest rate (i_1) on national markets and therefore an appreciation of the domestic currency ($E_0 > E_1$, in price/direct quotation) as foreign investors buy into domestic currency. An appreciation implies higher imports (M↑) as foreign goods are now relatively cheaper, whereas exports decrease (X↓)

as domestic products are now relatively more expensive. In total, positive export shocks are offset by increasing imports which implies no real changes in net exports. As such, only investment shocks actually move the IS curve up. In consequence, the natural level of output is exceeded ($Y_1 > Y^n$) and future or alternative investments in the FOCUS model have to cope with higher interest rates. This concludes the short-run discussion.

In the medium-run (scenario 1), an expansion on goods-market, i.e. an outward shift of the IS-curve implies rising aggregate demand, i.e. the AD-curve shifts up. In a first step, as aggregate supply reacts slower than aggregate demand due to contract-rigidity on labour markets, increasing demand leads to higher prices (P_1). Higher prices and lower unemployment induced by the positive output gap lead workers to demand higher wages as their bargaining power increases (due to lower unemployment) and their wages are threatened by price inflation (P_0 to P_1, $\pi\uparrow$). Consequently, the aggregate-supply curve, i.e. the AS-curve shifts up and offsets the outward-shift of the aggregate-demand curve resulting in a higher price level (P_2). The trade-off between unemployment and inflation—represented by the Phillips-curve—phases out and unemployment returns to its natural, long-term level.

An alternative path (scenario 2) assumes that the oil sands investments are substantial investments to the Canadian economy that push out the natural level of output permanently. These technological improvements boost productivity ($A\uparrow$), which implies higher real wages and a lower natural level of unemployment. Here, when AS- and AD-curve return to an equilibrium level, this level is actually higher than the historical output level of Y^n. Nevertheless, the price level rises, so the economy has to cope with temporary inflationary pressure.

In contrast to scenario 1, which describes only temporary positive effects of oil sands investments at the cost of rising prices, scenario 2 describes permanent improvements in terms of output and employment levels through oil sands investments.

V. FOCUS-Implementation and Results

To estimate the economic impact of future oil sands investments in the timeframe of 2005-2015, the FOCUS model is shocked in two ways. Firstly, investment expenditures on machinery and equipment and non-residential construction are continuously added on a per year bases, whereas secondly, export shocks start in 2010 only, representing the fact that production follows investments with delay. The appendix breaks down both shocks to the FOCUS model. Graph 1 portraits investment shocks per year from 2005 to 2015, subdivided into machinery and equipment and non-residential construction. Graph 2 depicts future revenues at $50 CAD/Barrel, where oil sands Future Potential (due to new investments) is used as proxy for the export shock from 2010 onward, under the assumption that additional production of oil is primarily exported.

FOCUS results are provided in the appendix in Table 1 and Graph 4. In the following, all results are reported as average percentage changes in comparison to the base case, i.e. the case without oil sands investments, from 2005 to 2015. Alternatively, results are reported per year to account for changes in variable signs, or reported in percentage points change for values measured in percent.

The economy in total seems to profit from oil sands investments and the subsequent export boom as measured by the real gross domestic product or output. Summarized in Table 1 and depicted in Graph 4, it is positive for all years under consideration and, on average, 1.3% higher than in the base case. As visible in Graph 4, output roughly follows investment expenditures, although with less distinct spikes and smoother curvature. Investment expenditures grow strongly in all years, as one would anticipate given the continuing oil sands investments. A closer look at Table 1 reveals that the large investments in machinery and equipment as well as in non-residential construction dwarf the investments in residential construction. In fact, starting in 2011, investments growth in that sector is strictly negative and therefore lower than in the base

cases. In other words, investments in residential construction are crowded out by oil sands investments, as these drive up the interest rate and therefore the cost of other investments. This is suggested by the positive and increasing percentage point change of both the 90-day paper rate on financial companies and the industrial bond rate relative to the base case. Furthermore, nominal after-tax corporate profits grow steadily over the entire time observed. More specifically, corporate profits grow by 17.1% per year on average and even reach a 26.5% change from the non-investment scenario in 2015.

Interestingly, real gross domestic product reaches maxima of growth above base case in the years of 2007 and 2013, when investment growth is particularly strong. Interestingly, in 2009, when investments peak once more, output only reaches low growth of less than 1% above the base case, i.e. the non-investment scenario. The particularly high value of import growth in that year accounts for the temporary decline in output.

Personal consumption is higher in the oil sands investments than in the base case scenario and seems to follow the development of total output with a lag of one year. Accordingly, real personal disposable income is 0.8% higher than in the base case, which also closely resembles the 0.7% increase in personal consumption relative to the non-investment scenario. Expenditure by Governments constantly grows and seems unaffected by the oil sands investments shocks or export shocks but rather following a long-term trend.

In international trade, the strong appreciation of the Canadian dollar, as visible in the tumbling nominal exchange rate, leads to import growth that is larger than export growth until 2010, when the positive export shocks induced by the oil sands investments come into play. This is also reflected in the development of the Terms of Trade that start off negative and then turn positive to be balanced on average. Accordingly, the Canadian economy faces negative net exports from 2005 to 2011, as consumers increasingly purchase abroad and not domestically.

This explains the drop both in real gross domestic product in 2009 and in personal consumption in 2010 which coincide with particularly strong import growth in 2009. As explained above, this picture of trade turns in 2010. With an ever appreciating Canadian dollar, the economy profits from the export shocks and balances net exports in 2011. In the following years, both exports and imports grow steadily.

In conclusion of the aggregate values, the oil sands investments combined with an expected growth in exports of oil suggest an outcome that is positive for the Canadian economy. Total output, personal consumption and governments' expenditure grow above levels estimated for the non-investment base case. Increasing exports counterbalances the growth in import, which is induced by an appreciating Canadian dollar. This appreciation originates from the large and continuous oil sands investments that push up interest rates.

Oil sands investments also lead to improvements on the labour market. As discussed in the Economic Consequences section, investments are expected to create new jobs and secure employment. Yet, the theoretical discussion also argued that unemployment will drop in the first years as consequence of the positive output gap following the initial investments, but will later increase, as the economy gradually returns to its long-term natural level of output and employment. However, it is not said that this future natural level equals the natural level in 2005. In other words, oil sands investments potentially increase the natural level of output and decrease the natural level of unemployment, as suggest in scenario 2 of the Theoretical Considerations.

FOCUS results support this theory. Unemployment drops in all years before rising in 2015. Employment and labour force participation follow the same pattern. As such, the economy might slowly return to its natural level starting in 2015. Although workers face inflation their average annual wages and salaries rise sufficiently so that real annual wages per employee grow by 1.6% above the base case. In short, oil sands investments increase wages and employment.

VI. FOCUS Shortcomings

The FOCUS model has been rather useful in helping us to analyze the impacts from the oil sands projects. The oil sands have so far been defined in FOCUS as increases in an investment stream and a subsequent increasing stream of oil exports. Although the model has offered many important results, it is important to keep in mind that the model is only a partial representation of reality. Despite growing in size, FOCUS and other models are still dwarfed by the overwhelming complexity of the real world. This remains true for an economy like Canada, even though often referred to as 'small open economy', i.e. implying it's negligible impact and influence on the world economy.

So it would not be a mistake to doubt the capability of FOCUS to capture full economic realities, despite its many benefits. Some examples of this can be seen in the simplicity of how some variables are defined. FOCUS lacks specific industrial details in the definitions of its consumption, investment and government model. This would be beneficial to our report on the oil sands in that we would be better able to consider how an overall shift of importance towards the energy and commodities markets, especially in the Canadian economy. It would also allow for a specific breakdown per sector of the effects of the oil sands which could define further benefits/drawback in certain industries leading to a more accurate and comprehensive series of results. For example, the investment into oil sands projects goes towards Non-Residential Investment and Machinery & Equipment (M&E) Investment. Giving particular focus toward the M&E investment, some of these products could be imported but the majority could be produced within Canada, spurring the manufacturing sector leading to spillover or multiplier effects within the economy. This leads us into our key shortfall of the FOCUS model.

The FOCUS model does not handle externalities and although it is understandable that externalities are, more often than not, defined in qualitative terms, they would give the model an

edge in being better able to depict socioeconomic effects. However, since there are many externalities one can discuss when researching the oil sands projects, and we have somewhat touched upon the issue of diversification of effects amongst sectors, we will centre our attention to the effects of pollution, ways to deal with these effects, and how to incorporate it all into the FOCUS model. The following section will give more detail into the types of pollution, the direct effects of it and what is being done and can be done to deal with it.

What comes to mind first is the issue of meeting emissions goals set out by global agencies and by the Canadian government itself. The failure to do so may not have a direct economic impact but the government of Canada could incur a negative reputation; and although this is difficult to quantify and include in the model, it could perhaps result in a decline/lack of foreign investment into Canada for environmental initiatives. Also, with the opportunity raised by the oil sands projects in terms of securing Canada's energy future, many plans for developing renewable energy sources could be put on hold or take a back seat to oil sands extraction and development, putting Canada behind in the up and coming 'green technology' industry. This could mean more lost investment opportunities that could potentially outlast any opportunities that the oil sands possibly present.

The issue remains of how to quantify this and incorporate it into the FOCUS model in an accurate enough manner so not to include any bias. One idea could be to include a variable which would subtract a small fraction of any additional investment due to the oil sands, which would represent the loss of potential long term investment that would arise from other 'green' programs. Deciding the size of that fraction, dependent on the magnitude of the oil sands investments, becomes the real issue as well as recognizing voluntarily negotiated environmental agreements towards 'greener' technology and the existence of municipal, provincial and federal rules and regulations. Another externality is the cost to the governments in putting forth motions to protect

the environment and to develop agencies to monitor the projects sites and the companies in terms of any dumping or excessive emissions. As oil sands projects grow in numbers, environmental agencies need to increase the number of supervisors to guarantee constant monitoring. This is a cost that can easily be included into the model.

A solution, then, is for the government to provide incentives (tax incentives or subsidies) to the companies for allocating extra investment towards developing their own 'green' technologies or outsourcing the development to (domestic) firms. The companies benefit because, apart from the direct economical advantages from the incentives, the technologies would provide efficiency, provide a better work environment for employees, protect the environment and people in surrounding areas, and the companies would boost their reputation. The government would benefit because the potential investment in 'green' technologies would not be lost, Canada would remain a leader in developing these technologies and the governments would gain a positive reputation. These tax incentives could also be easily included into the model as a way to deal with any externalities that would have also been included into the model.

Governments and companies have been somewhat involved in similar actions recommended above and these actions will be described in the next section. However, including pollution externalities and their solutions in the model as extensive as possible, would give more accurate results not only in terms of the oil sands projects but in terms of other projects that would probably incur similar pollution externalities.

VII. Oil Sands: Environmental Issues

A major concern for many are the effects of the oil sands projects on the environment; and it is these environmental issues that have historically, and even now, delayed some of the progress of these projects. Worries over air pollution caused by excess emissions or waste of surrounding land and waters have led to protests over the projects. The Canadian and Albertan governments have put forth new laws and stricter regulations to monitor and limit waste and emissions and to ensure that these pollutants are dealt with properly. At the same time, the governments have had to show caution over the degree of strictness of these laws and regulations as not to deter and discourage investment and expansion of the oil sands. The message that needs to be transmitted is that Canada can benefit greatly from the economic and political opportunities that have arisen from the development of the oil sands projects, all the while protecting the environment and remaining a global advocate for maintaining clean, healthy surroundings.

Fortunately for Canada, these efforts have not caused much deterring of investments into the projects and has also been greatly beneficial in inducing further investment into the research and development of technologies to reduce the environmental effects of the expansion, extraction and development of the oil sands. The oil sands project affects land during the mining process because of the need to clear cut trees and remove plant life, as well as the removal of topsoil due to the need to excavate. The depletion of plant life leads to a reduction of habitats for animals and this is aggravated by the fact that a typical oil sands project requires useage of land for decades.

The government of Alberta has developed a 'land reclamation' plan which calls for companies to 'remediate' and 'reclaim' Alberta's land so it can be productive again. Alberta requires reclaimed land to be able to support a range of activities similar to its previous use.[3] The

[3] Government of Alberta. (Mar. 19, 2008) "Alberta issues first-ever oil sands land reclamation certificate."

companies are required to replace topsoil, trees and plant life, so that the area can function as it once did. The government benefits through fewer issues with attracting investment, and companies can continue to start projects in Alberta. However, this comes at a cost for companies as they need to put forward more money towards these efforts, yet it also does work as an incentive for the companies to further invest in more efficient and eco-friendly ways of going about their operations. Although this is a good way to ensure land is not wasted, the issue remains that it could be decades before reclamation of an area is complete and even ensuring that reclamation is an ongoing process throughout the life of the project may not be enough to deal with this time concern.

There are also concerns over air pollution in that some of the extraction processes involve burning of natural gas for energy. Although regional and provincial associations that monitor air quality have stated that the levels of main pollutants are at reasonable levels, they have also found that high levels of hydrogen sulphide are found in the air around oil sands areas. Hydrogen sulphide is the pollutant emitted from the burning of natural gas. The Alberta government in conjunction with many municipal groups from the oil sands area, have worked to maintain a daily monitoring system and issue Environmental Protection Orders to companies responsible for the projects should emissions exceed an acceptable level set by Canada and Alberta's environmental protection laws.[4]

Water pollution concerns are also growing for two main reasons; overuse of water and contamination of potable water. Water in substantial amounts is needed in some of the extraction processes used in the projects. Given the limited water supply of the Athabasca River, the projects could severely deplete this supply thereby limiting expansion and future development.

[4] Government of Alberta. (Dec. 18, 2007) "Province orders Suncor to address excessive H2S emissions."

The government has imposed limits on how much water companies can remove from the rivers near the project sites, but organizations like Greenpeace claim that the limited amounts are still too much. While contamination is another issue that is having serious effects on humans and animal life as one moves downstream from the project areas. Mutated animals and fish have been found downstream from project sites as well as certain diseases in the animal life that depend on the water; this has been attributed to oil and chemical spillage and/or possible dumping coming from the sites.

Another related danger is how these various sources of pollution affect surroundings towns and nearby native Canadian reservations. People living in these surrounding cities and reservations have experienced higher instances of cardiovascular and respiratory issues, and rare cancers believed to be linked to the chemicals leaked into the air and waters. Aboriginal peoples living on the reservations who rely heavily on the freshwater from the rivers and the animal life in the area have found links between the health concerns they face and the higher levels of toxic chemicals such as mercury and arsenic in the water, which is ingested by the animals.

These environmental issues that derive from the expansion of the oil sands projects have many complaining and calling for a slowdown in expansion or even a complete halt. As can be seen, the federal, provincial and municipal governments are all doing their part in trying to reduce these negative consequences and their externalities. In some cases, intervention does help significantly, because it forces companies to further invest in ways to ‘clean up’ their projects; new ‘eco-friendly’ technologies can help, but their development requires time and until then these issues may continue to plague the oil sands projects and the public.

VIII. Conclusions

Throughout the history of the oil sands projects in Canada, there have been many arguments for and against going forward and supporting the development of these projects. The economic consequences for Canada make the projects seem too good of an opportunity to pass up. In their report to the government's Standing Committee on Natural Resources, both CAPP and CERI draw an optimistic picture of the economic consequences of oil sands development for Alberta and, in particular, all of Canada.

The vast amount of money and resources that will be invested into pushing forward these ventures will clearly be beneficial in oil and energy related industries. However, most importantly, it is noteworthy to realize that the investments in the oil sands will also positively affect neighbouring industries and therefore create positive externalities in sectors as diverse as business services, manufacturing, retail, finance and insurance. Employment is expected to increase not only in Alberta, but throughout Canada. Given profitable oil sands operations in Alberta, government revenues are expected to rise on municipal, provincial and federal level.

To get a better idea of how future oil sands development will impact the economy over the specific time period of 2005-2015, the FOCUS model was shocked in two ways. Investment expenditures on machinery and equipment and non-residential construction are added until 2015, and export shocks are added starting in 2010, since production follows investments with delay. Essentially, it is clear to understand that an oil sands project may begin at a certain date but it may not yield output for a few years, in this case 5 years. Overall, FOCUS found that these element adjustments led to a potential positive outcome for the Canadian economy. Total output, personal consumption and governments' expenditure grow and the exports growth offsets the import growth that is experienced due to a Canadian dollar appreciation. This appreciation

originates from the large and continuous oil sands investments that push up interest rates. Unemployment drops in all years before rising in 2015.

These key results show the positive impacts the oil sands can offer to Canada's economy as it slowly trends to its new higher natural level of output starting in 2015. As mentioned earlier, with the good aspects clearly seen and plentiful within our analyses, also come some negative aspects, which are calls against the oil sands projects. The environmental issues cause large debates and protests, and although the economic and social benefits that arise seem to outweigh these issues, they still are a heavy burden on the future of the projects. Issues with air, water and land pollution lead to negative impacts on plant and wildlife but more importantly, they are reflected in health hazards to people in surrounding areas. These health issues have negative economic impacts, also in terms of the costs of health care for the people who are affected by the pollution and related disease/illness. When factoring all these pros and cons into a decision making process, one must ultimately decide in favour of the oil sands.

The benefits do outweigh the drawbacks and this point is further emphasised when one considers the efforts being made by governments and companies alike to deal with and prevent future hazards to personnel and environment. The investment drives new, innovative technologies that deal with pollution and that are conceived in Canada giving a boost and an advantage to the Canadian manufacturing sector and to green sectors. The incentives will allow companies to not only receive accolades for their ethics but receive a monetary advantage in the way they conduct their everyday business. Only when all of this is considered, can the final recommendation for continuing with the oil sands, for both outside companies and for Canada, be made. We are in the midst of an energy revolution and given the scarcity of oil and its importance to our everyday lives, the oil sands aid in satisfying our demand and in granting more time to develop new energy sources. In both of these regards, the oil sands will make Canada a global leader.

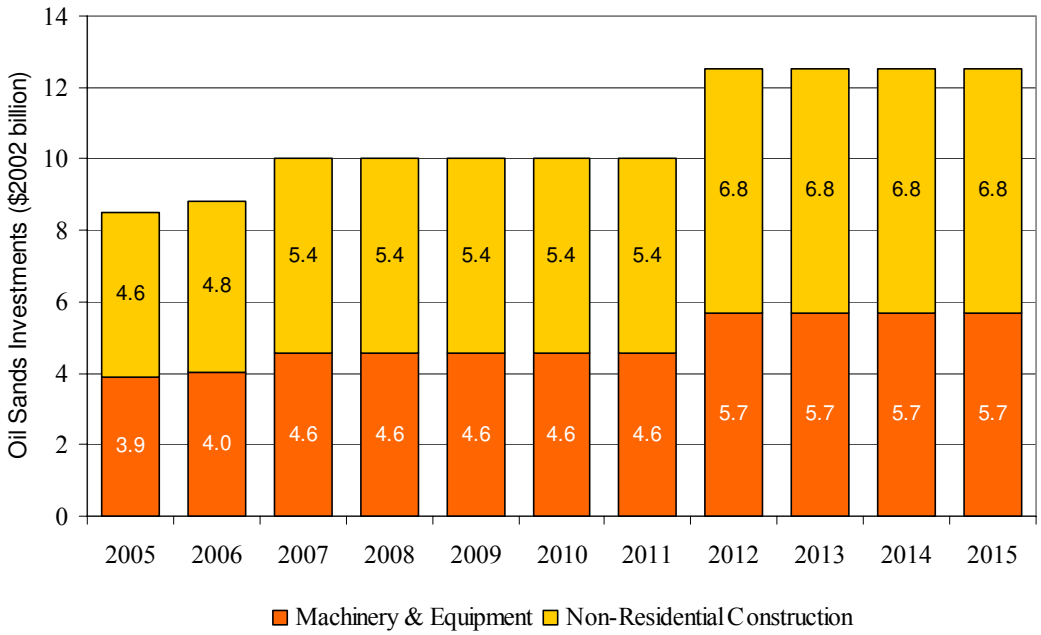
IX. Appendix

Table 1: Summary of Projection

	2005	2007	2009	2011	2013	2015	Mean
Real Gross Domestic Product	0.92 1.	41 0.	99	1.2	1.87	1.65	1.3
Real Gross National Product	0.95 1.	5 1.	02	1.22 1.	7	1.09	1.2
Expenditure on Personal Consumption	0.31 0.	92 0.	64 0.	41 0.	96	0.97	0.7
Expenditure by Governments	0.04 0.	18 0.	38 0.	56 0.	73	0.86	0.5
Investment Expenditure	3.97 4.	92 4.	98 4.	82 5.	89	4.99	4.9
Residential Construction	0.69 1.	21 0.	29	-0.88	-1.61	-3.63	-0.7
Non-Residential Construction	7.75 8.	88 8.	29 8.	13 9.	79	8.92	8.6
Machinery and Equipment	4.19 5.	27 6.	28 6.	94	8.8	8.51	6.7
Exports	0.1	0.63 0.	67 1.	17 2.	56	3.82	1.5
Imports	0.38 1.	03 1.	62 1.	15	2.4	3.88	1.7
Gross Domestic Product	0.96 2.	45 3.	62 5.	02 6.	77	7.04	4.3
Implicit Deflator for GDP	0.04	1.02 2.	6 3.	77	4.81	5.3	2.9
GDP Deflator - Inflation Rate *	0.04	0.64 0.	8 0.	55	0.49	0.1	0.4
Unemployment Rate *	-0.3	-0.52 -0	.21 -0	.11 -0	.19	0.28	-0.2
Employment	0.4 0.	9 0.	5	0.23	0.33	-0.35	0.3
Labour Force	0.08 0.	34 0.	27	0.1	0.13	-0.05	0.1
Participation Rate *	0.05 0.	23 0.	18 0.	07 0.	09	-0.04	0.1
Finance Co. 90-Day Paper Rate *	0.05 0.	17 0.	05 0.	19	0.4	0.41	0.2
Industrial Bond Rate *	0.05 0.	17 0.	05 0.	19 0.	41	0.41	0.2
Consumer Price Index	0.05	0.99 2.	4	3.5 4.	38	4.69	2.7
CPI - Inflation Rate *	0.05 0.	59 0.	74 0.	49 0.	41	0.01	0.4
Average Annual Wages and Salaries	0.24 1.	82 3.	77 5.	26 6.	87	7.84	4.3
Real Annual Wages per Employee ($92 '000)	0.2 0.	83	1.34 1.	7 2.	39	3.01	1.6
Productivity Change (GDP/Employee)	0.51 0.	5 0.	48	0.95	1.51	1.99	1.0
Exchange Rate (US $/Cdn $)	-0.57 -2	.45	-2.75	-4.8	-4.53 -2	.65	-3.0
Terms of Trade (PX/PM)	-0.1	-0.28 -0	.03 -0	.11	0.18	0.63	0.0
Balance on Current Account ($ Mill) *	-1745	-4901 -8	752 -6	099 -4	996	-4601	-5182.3
Consolidated Government Balance ($ Mill) *	5086	12043 7	954	6855 1	2374	7063	8562.5
Federal Gov't Balance (NA Basis) ($ Mill) *	2587	6651 4	831 5	394 8	931	7242	5939.3
Ratio: Federal Debt to GDP (%) *	-0.4 -1	.5 -2	.7 -3	.4 -4	.4	-5	-2.9
Prov'l Gov't Balance (NA Basis) ($ Mill) *	2295 4	670	2258	405	1830	-1965	1582.2
Ratio: Provincial Debt to GDP (%) *	-0.2 -0	.9 -1	.6 -1	.9 -2	.3	-2.2	-1.5
Personal Savings Rate (%) *	0	-0.3	-0.1	0.2 0 0.		1	0.0
Nominal After-Tax Corporate Profits	4.8	8.5	15.5 21	.1 26	.3	26.5	17.1
Real Personal Disposable Income	0.3 0.	7 0.	6 0.	7 1.	3	1.4	0.8

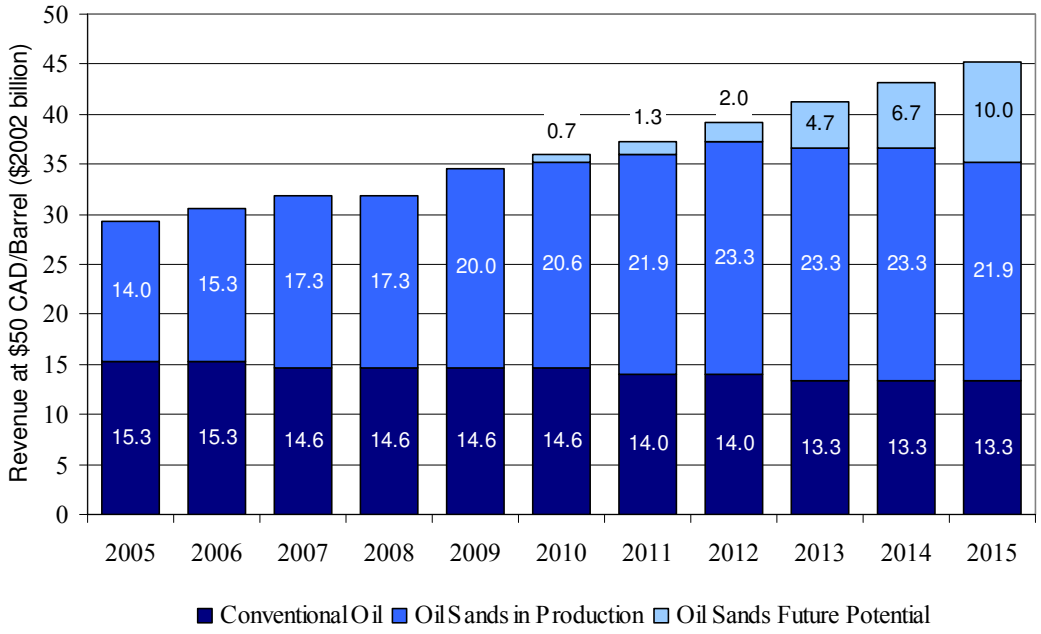
(Percentage change; * Indicates change in levels)

Graph 1: Oil Sands Investments as FOCUS Shocks



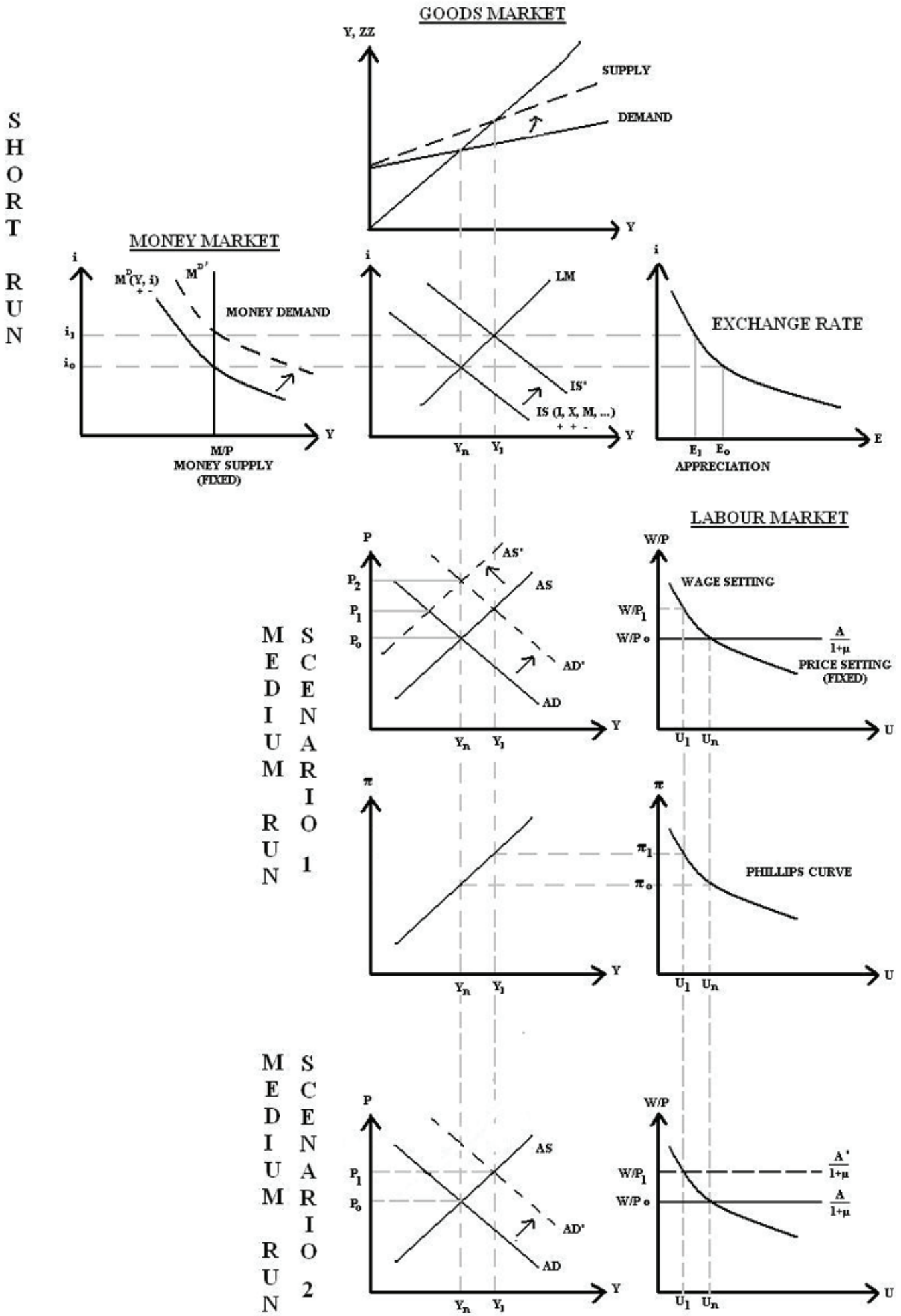
Source: Alberta Finance and Enterprise - Budget and Fiscal Planning. (May 2008) "Economic Spotlight: Alberta's Investment Boom."

Graph 2: Oil Revenues, Future Potential (=Exports) as FOCUS Shock



Source: Canadian Association of Petroleum Producers. (April 2008) "Oil Sands Economic Impacts Across Canada."

Graph 3: Oil Sands Investments in the IS-LM/AS-AD model



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