**Wage Inflation in Alberta’s Oil and Gas Sector**

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**Overview**

Often, projects in the Alberta oil sands are associated with significant cost overruns that hamper economic growth not only in the industry, but in the entire province. These budget overages are largely attributable to wage inflation in the region. Operations at Imperial Oil’s Kearl oil sands project, for example, ran months behind schedule and billions over budget due to a shortage of skilled labour and increased wage costs (Blair, 2013). Operating conditions characterized by skyrocketing labour costs are not sustainable, and may jeopardize future development in the Alberta oil sands. The 2014 drop in oil prices resulted in job losses in Alberta.

Given the importance of oil sands development to Alberta’s economy, wage inflation has become a major concern. Over the period January 2001 to December 2013, nominal wages have increased by 73% in the oil and gas sector. The wage level for oil sands occupations in the oil sands region is higher than outside the region, reflecting that compensation is a comparative advantage of oil sands (MIHR, 2013). These astronomical wage increases reflect a strong need to attract and retain labour in the oil sands. Employers compete for a limited pool of skilled labour, and employees are thus able to demand higher wages. In fact, labour costs were expected to increase by another 2 to 3.5% in the oil sands industry in 2014 (Lewis, 2013). According to Alberta Treasury Board and Finance (2013), Alberta had the highest job growth and lowest unemployment rate in Canada in 2012.

The oil and gas sector is capital-intensive and accordingly involves a great deal of overlap with construction sector activities. Lewis (2013) states that Cenovus biggest risk was its construction costs. El Segundo (2014) explains that the increase in construction costs in North America is linked to the increase in wages in the oil and gas sector, which is caused by the demand for tight oil and shale gas. While infrastructure development is necessary, it actually exacerbates the wage inflation problem because employers in the construction and oil and gas sectors compete for workers with similar skill sets. In fact, over the period January 2001 to December 2013, average nominal weekly wages increased by 88% in the construction sector.

**Objective and Methodology**

We carry out econometric analyses to find the main determinants of wages in Alberta’s oil and gas sector. This study is important because soaring wages create downward pressure on the sector’s profitability and hinder economic growth. We are particularly interested in learning how oil-price shocks and associated macroeconomic and sector-specific effects affect wages in the oil and gas sector in order to be able to provide cost-reducing industrial and governmental policy prescriptions.

Our model builds on the standard Phillips curve relationship. The model also includes other determinants. To account for inter-sectorial linkages, we include wages and the unemployment rate in the construction sector and public expenditures in Alberta. To account for business-cycle factors, we include the yields of the U.S. Treasury bonds and the West Texas Intermediate (WTI) oil price as indicators of global economic activity. To account for pipeline bottlenecks faced by Alberta’s oil producers, we also include the ratio of WCS to Maya. The intuition here is that the oil sands’ product is a close substitute to Mexican oil and hence, absent bottlenecking and transportation barriers, should be priced at similar levels. The lower the ratio of WCS to Maya, the lower should be the profit rate obtained by oil sands’ producers. Hence, the lower should be the labour quantity demanded (and the wages paid) by Alberta’s oil and gas sector.

Using Canadian Socioeconomic Information Management (CANSIM) data from Statistics Canada for two time samples (January 2001–December 2013, and January 2004–December 2013), we employ an error correction model (ECM) and vector autoregressive (VAR) techniques to analyze the impacts of the variables of interest on wages in the oil and gas sector. Knowledge about how various factors jointly influence wages can inform organizational and governmental strategies to ensure optimal outcomes for both the oil sands industry and the province.

To our knowledge, our paper is the first to examine the impact of oil-price and macroeconomic changes, market access, and inter-sectorial effects on wage growth in Alberta’s oil and gas sector. Emery et al. (2009) is the only paper that examines the impact of oil-price changes in Alberta. They study the impact on the accumulation of human capital. Unlike these authors, we examine the impacts of oil prices and other factors on wages.

Dissou and Karnizova (2014) emphasize the importance of examining industry-level responses to oil-price shocks in order to understand the transmission of these shocks through the economy. They build a multi-sector dynamic stochastic general equilibrium (DSGE) model to calibrate the input-output structure of the U.S. economy, disaggregating the economy into five sectors, and find “inter-sectorial linkages can amplify the effects of oil price changes” (Dissou and Karnizova 2014, p. 6). They utilize a closed-economy model calibrated for the US economy. Unlike Dissou and Karnizova (2014), our paper’s main goal is to determine which factors have contributed to the evolution of wages in the oil and gas sector in Alberta (an oil-exporting province). Our methodology is based on time-series econometrics.

**Results**

We find that one must account for inter-sectorial linkages. We find evidence that suggests that competition for scarce labour among oil and gas firms, construction firms and the public sector is an important aspect underlying the evolution of wages in the oil and gas industry. Other important determinants of wage growth in the industry are low unemployment rates in oil and gas and construction sectors and the yields of the US Treasury bonds. We also find that WTI oil-price is a crucial determinant of the key explanatory variables in the model. In other words, WTI indirectly drives wages in Alberta’s oil and gas sector. Hence, we use actual and future WTI prices to forecast and simulate wages in Alberta’s oil and gas industry.

**Conclusion/ Policy Recommendations**

It would be beneficial for companies in the oil and gas and construction sectors to coordinate hiring policies to avoid ongoing substantial wage inflation. Our analysis yields two policy prescriptions. Labour costs can be reduced with geographic labour-market segmentation. In addition, labour costs can be reduced if the government adopts counter-cyclical expansionary infrastructure policies.

**References**

Alberta Treasury Board and Finance. (2013, January). *Labour Market Notes*. Edmonton: Government of Alberta. Document available online at: http://www.finance.alberta.ca/aboutalberta/labour-market-notes/2013/2013-01-labour-market-notes.pdf

Arora, Vipin, and Pedro Gomis-Porqueras (2011). “Oil Price Dynamics in a Real Business Cycle Model.” *CAMA Working Paper 17/2011*. Canberra: Centre for Applied Macroeconomic Analysis, The Australian National University. Document available online at: http://ideas.repec.org/p/een/camaaa/2011-17.html

Baumeister, Christiane, Gert Peersman, and Ine Van Robays (2009). “The Economic Consequence of Oil Shocks: Differences across Countries and Time.” In Renée Fry, Callum Jones, and Christopher Kent (eds.), *Inflation in an Era of Relative Price Shocks*. Sydney: Reserve Bank of Australia. Document available online at: http://www.bankofcanada.ca/wp-content/uploads/2011/11/BPVR.pdf

Blair (2013, December). End of an era: new oil sands mines held back by cost. Alberta Venture. Document available online at: http://albertaventure.com/2013/12/imperial-oil-kearl-oil-sands-mine-over-budget/

Dissou, Yazid, and Lillia Karnizova. (2014). “Comovement of Oil Prices with US Economic Indicators over the Business Cycle: Facts and Explanations.” *Working Paper 1401E*. Ottawa: University of Ottawa. Document available online at: <https://socialsciences.uottawa.ca/sites/default/files/public/eco/1401e.pdf>

El Segundo (2014, February). *Rising Wages in Gas and Oil Work Push up Overall us Construction Costs in February*. Document available online at: http://press.ihs.com/press-release/design-supply-chain/rising-wages-gas-and-oil-work-push-overall-us-construction-costs-f

Emery, Herb, Ana Ferrer, and David Green (2009). “Long-Term Consequences of Natural Resource Booms for Human Capital Accumulation.” Working Paper. Document available online at: http://www.clsrn.econ.ubc.ca/workingpapers/CLSRN%20Working%20Paper%20no.%2074%20-%20Abstract.pdf

Humphrey, Thomas M. (1985). “The Evolution and Policy Implications of Phillips Curve Analysis.” *Economic Review*, 71(2): 3-22.

Jimenez-Rodriguez, Rebeca, and Marcelo Sanchez. (2004, May). “Oil Price Shocks and Real GDP Growth Empirical Evidence for some OECD Countries.” *Working Paper No. 362*. Frankfurt: European Central Bank. Document available online at: https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp362.pdf

Lewis, Jeff. (2013, December 9). “Energy Majors in Western Canada Brace for Rising Labour, Capital Costs.” *Financial Post.* Document available online at: http://business.financialpost.com/2013/12/09/energy-majors-brace-for-rising-labour-capital-costs-in-oil-sands/

Llaudes, Ricardo. (2005, February). “The Phillips Curve and Long-Term Unemployment.” *Working Paper No. 441.* Frankfurt: European Central Bank. Document available online at: https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp441.pdf

Mendez-Marcano, Rodolfo. (2014). “Technology, Employment, and the Oil-Countries Business Cycle.” *Working Paper 1405*. Madrid: BBVA Bank. Document available online at: http://ideas.repec.org/n/nep-cis/2014-02-15.html

Mining Industry Human Resources Council (MIHR). (2013). *Mining in Canada’s Oil Sands, Labour Market Trends and Human Resources Challenges.* Edmonton, AB: Government of Alberta.

Peersman, Gert and Ine Van Robays. (2009). “Oil and the Euro Area Economy.” *Economic Policy*, 24(60): 603-651.