

# Intelligence MEMOS



From: Thomas R. Covert and Ryan Kellogg  
To: Concerned Canadians  
Date: October 18, 2017  
Re: **CRUDE BY RAIL, OPTION VALUE, AND PIPELINE INVESTMENT**

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Between 2010 and 2014, crude-by-rail volumes out of North Dakota grew from essentially nothing to more than 750,000 barrels per day. At its peak, crude oil shippers moved more than 10 percent of total US domestic production by rail. At its peak, Alberta producers were also flocking to the rail option, with nearly [180,000 barrels](#) per day leaving Canada by rail. Since late 2014, however, crude-by-rail volumes have fallen substantially in the US and Canada.

One interpretation of these recent shifts is that crude-by-rail was merely a transitory phenomenon, and that pipelines will henceforth once again convey nearly all overland crude oil flows. There is, however, an alternative view of these events. We see the rise and fall of crude-by-rail as underscoring the option value that railways provide to crude oil shippers by allowing them to flexibly decide when and where to ship crude in response to changes in upstream and downstream prices. We set out to quantify the economic importance of this option value by assessing the extent to which crude-by-rail has depressed investment in pipelines.

While pipelines have low per-barrel amortized costs relative to rail, these costs are nearly all borne up-front, during pipeline construction. Prospective pipeline shippers must sign long-term (e.g., 10 year) “ship-or-pay” contracts that commit them to paying a fixed tariff per barrel of capacity committed, whether they actually use it or not. Importantly, shippers must make this commitment without knowing what future oil prices will be. In contrast, rail provides non-pipeline shippers with a means to arbitrage spatial price differences without making such long-term commitments. This flexibility generates option value, which is further enhanced by the availability of railways to reach multiple destinations, not just the single destination served by a pipeline.

Thus, the availability of crude-by-rail reduces shippers’ incentives to commit to pipeline capacity. An example of this effect occurred in June 2014 when the (now completed) Dakota Access Pipeline (DAPL) announced it had received firm commitments from shippers to support a 470,000 barrels per day line to the Gulf Coast. We [evaluated the importance](#) of crude-by-rail by asking how much larger DAPL would have been had crude-by-rail been more costly. The results indicate that changes in railway transportation costs can substantially affect shippers’ incentives to commit to pipelines: a \$1 per barrel increase in the cost of rail (relative to a baseline shipping cost of \$11 per barrel) leads to an increase in pipeline capacity of 29,000 to 74,000 barrels per day. The ability of crude-by-rail shipments to reach multiple destinations also affects investment incentives: in the absence of the spatial option value of rail, the capacity of DAPL would have been 26,000 to 64,000 barrels per day larger.

Even though rail volumes may ebb and flow over time, the existence of the rail option can durably reduce the incentive to invest in pipeline capacity. Many factors drive the relative costs of shipping oil by rail or pipelines, such as harm from emissions or spills as shown by [Clay et al.](#) Policymakers should keep in mind these complex economic factors that determine how oil producers choose to get their products to consumers or why pipeline companies decide to pursue, or not, new pipeline construction projects.

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