Pipeline Approval Delays: the Costs of Inaction

- **Canada's oil patch once again finds itself with too much crude and too few pipelines, depressing the value of Canadian crude relative to US and global benchmarks.**
- **The mid-November service suspension on the Keystone pipeline hastened the arrival of takeaway capacity tightness and sparked the latest flare-up in Canada oil discounts.**
- **We anticipate that discounts will remain elevated until Line 3 enters service in the latter half of 2019, though it will likely take the completion of either TMX or KXL by 2020 or later before differentials return to a state reflective of adequate takeaway capacity.**
- **Given the excess of production over takeaway capacity through this period, the price received for Western Canadian oil will remain vulnerable to service disruptions in current transportation channels.**
- **Pipeline approval delays have imposed clear, demonstrable and substantial economic costs on the Canadian economy. If maintained at current levels, the discount on Western Canadian oil would shave C$15.6 billion in revenue annually from the sector.**
- **An expected shift from pipeline to oil-by-rail will mitigate some of this impact, reducing foregone revenues in 2018 to a still-high C$10.8 billion.**

Pipeline bottlenecks and insufficient transportation infrastructure are long-running themes in the Canadian oil industry. Canada is blessed with the world's third-largest proven oil reserves behind only Venezuela and Saudi Arabia, but Alberta's bituminous bounty is more than one thousand kilometers from Pacific ports in British Columbia and three-times that distance from major refineries on the US Gulf Coast. The relatively isolated nature of Canadian energy resources in the Western Canadian Sedimentary Basin (WCSB) comes at a cost—producers pay roughly $10–12/bbl to move their product south by pipeline to refineries on the US Gulf Coast (USGC) and $20/bbl or more to make the same trip by rail car.

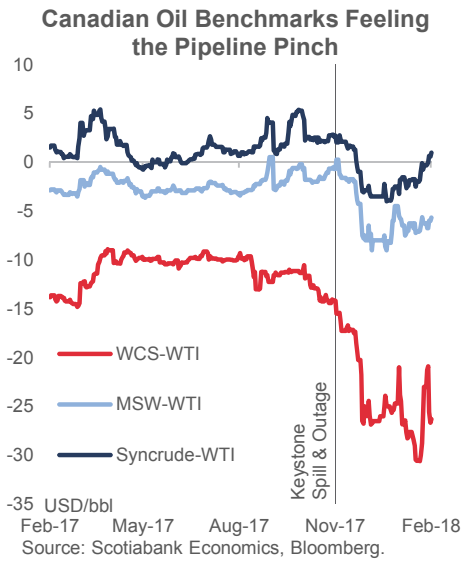
Canadian oil needs to be discounted by an amount proportionate to transportation costs in order to remain competitive with alternative crude suppliers. When production is growing faster than pipeline capacity, like it is in the WCSB, the cost of transporting the marginal barrel to market becomes increasingly expensive and discounts can rise far beyond their typical level. **The Canadian oil patch finds itself once again in what we expect to be at least an 18-month period of acutely contained takeaway capacity** (charts 1 and 2). This latest flare-up in Canadian crude discounts was a long time coming but the situation became a much more immediate concern following the mid-November spill and subsequent service suspension on the Keystone pipeline. We believe that Canadian crude discounts will narrow following the completion of Line 3 in the latter half of 2019, but anticipate that discounts will remain abnormally wide until the completion of either the Trans Mountain Expansion (TMX) or Keystone XL (KXL) pipelines can satiate the near-term demand for regional takeaway capacity.

CONTACTS

Jean-François Perrault, SVP & Chief Economist
416.866.4214
Scotiabank Economics
jean-francois.perrault@scotiabank.com

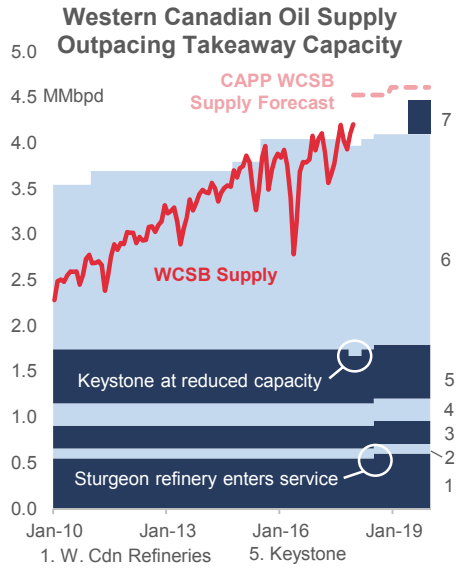
Rory Johnston, Commodity Economist
416.862.3908
Scotiabank Economics
rory.johnston@scotiabank.com

Chart 1



Source: Scotiabank Economics, Bloomberg.

Chart 2



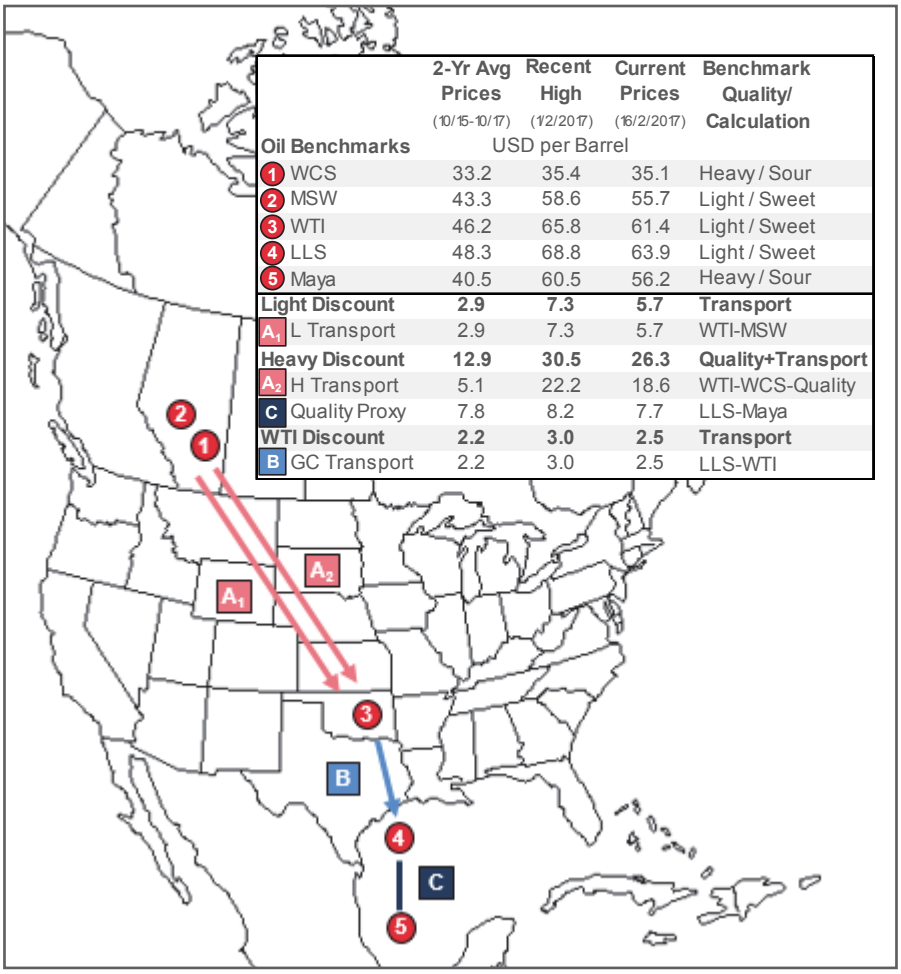
Source: Scotiabank Economics, NEB, CAPP, RBN.

ANATOMY OF CANADIAN OIL DISCOUNTS: QUALITY VS TRANSPORTATION

Western Canadian Select (WCS) is Canada's primary heavy crude oil benchmark and it trades at a discount to US-based West Texas Intermediate (WTI), reflecting the lower relative quality of WCS as well as the cost of transportation. This discount is natural and averaged $13/bbl between November 2015 and November 2017. See Map 1 for a stylized illustration of the relative pricing dynamics and cost considerations behind different North American crude benchmarks.

Quality: First, no two grades of crude oil are identical and quality differences depend on the "gravity" or density of the oil (light vs heavy) as well as the crude's sulphur content (sweet vs sour). WCS is a heavy sour crude, which means that it requires more complex and expensive refining methods to produce lighter consumer fuels like gasoline relative to WTI, which is a light sweet crude. The price difference between Louisiana Sweet (LLS, a light sweet crude similar to WTI priced at the USGC) and Maya (a Mexican seaborne heavy sour crude of similar quality to WCS) has averaged roughly $8/bbl over the past two years and can be used as a rough proxy for this quality discount (C on Map 1). While the quality discount fluctuates based on the supply of and demand for heavy crudes relative to lighter varieties, it is less volatile than transportation-related drivers of the WTI-WCS spread.

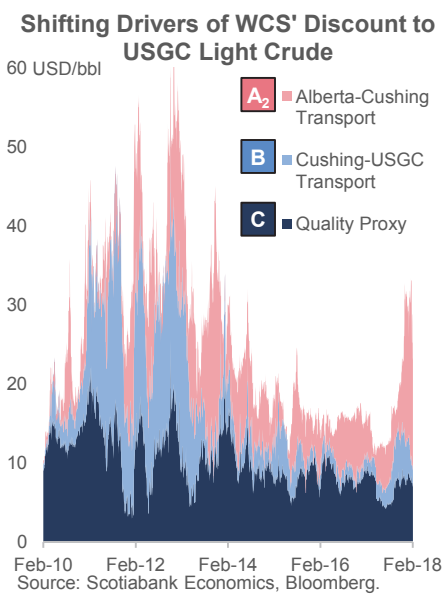
Map 1: Stylized Illustration of Alberta-Cushing-USGC Crude Benchmark Dynamics



Oil Benchmarks	2-Yr Avg Prices (10/15-10/17)	Recent High (1/2/2017)	Current Prices (16/2/2017)	Benchmark Quality/ Calculation
	USD per Barrel			
1 WCS	33.2	35.4	35.1	Heavy / Sour
2 MSW	43.3	58.6	55.7	Light / Sweet
3 WTI	46.2	65.8	61.4	Light / Sweet
4 LLS	48.3	68.8	63.9	Light / Sweet
5 Maya	40.5	60.5	56.2	Heavy / Sour
Light Discount	**2.9**	**7.3**	**5.7**	**Transport**
A_1 L Transport	2.9	7.3	5.7	WTI-MSW
Heavy Discount	**12.9**	**30.5**	**26.3**	**Quality+Transport**
A_2 H Transport	5.1	22.2	18.6	WTI-WCS-Quality
C Quality Proxy	7.8	8.2	7.7	LLS-Maya
WTI Discount	**2.2**	**3.0**	**2.5**	**Transport**
B GC Transport	2.2	3.0	2.5	LLS-WTI

Transportation: The second key component of Canadian oil discounts relates to the cost of transportation and depends on the geographic position of a crude benchmark relative to demand centres as well as the state of existing "takeaway" infrastructure—the system of pipelines, local refineries and rail terminals that transport oil from where it's produced to where it's consumed (chart 2). WCS is priced in Hardisty, Alberta and WTI is priced in Cushing, Oklahoma; the quality-adjusted WTI-WCS discount has averaged roughly $5/bbl over the past two years and can be used as a proxy for the cost of transporting crude between these two locations (A_2 on Map 1). It is also important to note that transportation dynamics vary between heavy (e.g. WCS) and light Canadian crude grades (e.g. MSW or Syncrude) due to different heavy/light pipeline capacities (A_1 vs A_2 on Map 1). Heavy crudes have typically had to deal with tighter takeaway capacity due to faster heavy production growth and lagged heavy pipeline construction, but both light and heavy grades have been impacted by recent takeaway tightness. Occasionally, WCSB production has outstripped regional takeaway capacity and implied heavy oil transportation costs embodied in the WTI-WCS differential have spiked from $5/bbl to $20–30/bbl as crude is forced onto more expensive means of transportation. Similarly, WTI can also trade at a discount to seaborne benchmarks of similar quality on the USGC, like LLS, due to Cushing-USGC pipeline constraints and this differential has at times contributed to an even wider discount between Canadian oil prices and global seaborne benchmarks (chart 3).

Chart 3



Source: Scotiabank Economics, Bloomberg.

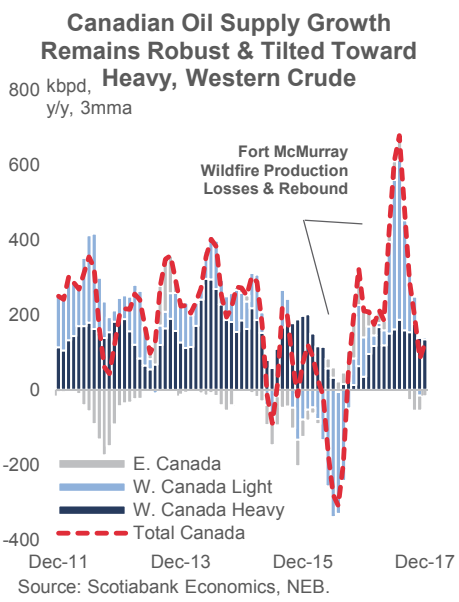
PIPE DEFICIT: INSUFFICIENT TAKEAWAY CAPACITY AND THE IMPACT ON CANADIAN OIL DISCOUNTS

Pipeline and associated infrastructure in the WCSB region continues to be constructed but capacity has often lagged production growth due to project delays related to market uncertainty, environmental concerns, and political opposition. In the past few years alone, KXL has endured a decade-long regulatory delay—the project was initially supported by the Obama Administration before being rejected in 2015, then was reborn under the President Trump—while other pipelines like Northern Gateway and Energy East have been proposed and subsequently abandoned, due in part to significant regulatory hurdles and political challenges.

WCSB producers have frequently run up against the limits of sluggish takeaway capacity over the past decade, with surplus crude ending up on more expensive forms of transportation like rail or in storage until sufficient capacity becomes available. As the cost of getting Canadian crude to market rises, prices of Canadian crude benchmarks need to fall proportionally so that delivered prices remain competitive with alternative suppliers. The WTI-WCS discount has varied from a typical range of $10–15/bbl when takeaway capacity is adequate to more than $40/bbl when capacity constraints become particularly acute, as they did in 2006–7, 2012–13, and today. These blowouts in the WTI-WCS discount have proven temporary but resulted in material value losses for WCSB producers.

Oil sands operations and pipeline projects have long lead times and many market observers, including Scotiabank, have been warning that another flare-up in Canadian oil discounts was around the corner. Given steady growth in WCSB oil production—up 85% since early 2010 to 4.2 MMbpd as of December, 2017 (chart 4)—and no real progress on new pipeline capacity, we anticipated that WCS discounts would rise to $18/bbl in 2018 from $12/bbl in 2017 as takeaway capacity became increasingly tight over the course of the year. However, the Keystone pipeline spill in mid-November accelerated this narrative, and the WTI-WCS discount has widened considerably as Canada's oil patch finds itself once again with too much crude and too few pipelines.

Chart 4



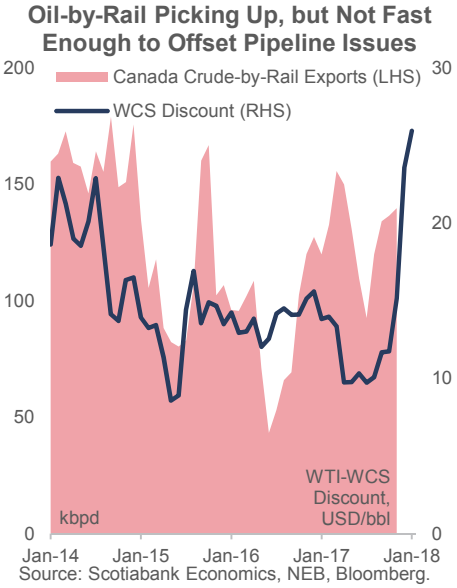
Source: Scotiabank Economics, NEB.

TIGHT AGAIN: WESTERN CANADIAN SELECT'S LATEST TUMBLE AND WHERE WE GO FROM HERE

The latest spike in the WTI-WCS discount began on November 16th when the operator of the Keystone pipeline detected a drop in pressure on the line, indicating a possible leak. A ~5,000 barrel oil spill was discovered and the pipeline was subsequently shut down for 12 days as repairs were made; Keystone is currently operating at 20% reduced capacity on regulatory orders, keeping heavy crude takeaway capacity at least temporarily tighter than before the outage. The pipeline suspension backed up nearly 600 kbpd of heavy crude oil into Albertan storage tanks, prematurely filling inventory capacity that was expected to act as a pressure relief valve over the coming 18 months when pipeline capacity was forecast to be insufficient.

Discounts for WCS heavy crude rose rapidly following the Keystone outage, from $13/bbl in the year prior to the outage to more than $30/bbl at their peak; while heavy crude has been particularly hard hit, Canadian light crude benchmarks (e.g. MSW and Syncrude) have also felt the pipeline pinch and discounts have risen by roughly $4/bbl relative to before the Keystone outage. While differentials are forecast to narrow through the year, takeaway capacity is expected to be strained until Line 3,

Chart 5



Source: Scotiabank Economics, NEB, Bloomberg.

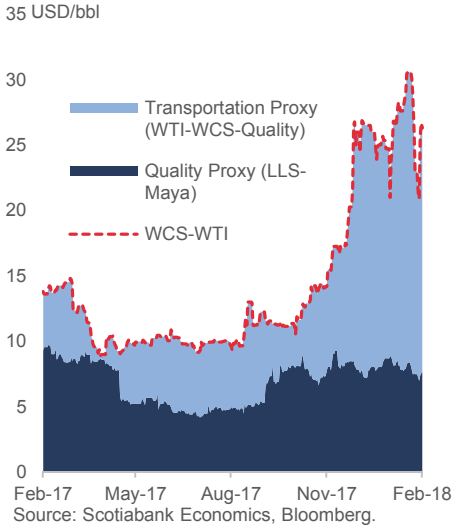
the first of the major pipeline projects, enters service in the latter half of 2019. However, we anticipate that Line 3 alone will be insufficient and that the market will require either the TMX or KXL before Canadian crude discounts fall back to levels associated with sufficient takeaway capacity.

WCSB producers with crude oil stranded by insufficient takeaway capacity have two main options: 1) move shipments onto higher-priced railcars, or 2) store the oil in provincial tank farms until sufficient capacity is made available.

Oil-by-rail shipments have been on an upswing since reaching a recent low in May 2016 (chart 5), but have as of yet been unable to completely fill the pipeline gap. The economics of the current WTI-WCS differential put rail transport arbitrage clearly in the black, but news reports indicate that rail providers are hesitant to jump back headlong into the oil-by-rail business after being burned as demand for rail transport dried up following the 2014 oil price collapse. Major rail companies like CP and CN Rail are aware that oil-by-rail transportation is a stop-gap solution and that demand for railcars will likely fall back after less expensive pipeline capacity becomes available near the end of the decade. To compensate for this temporary demand, rail providers are asking oil producers to agree to multi-year, take-or-pay contracts that demonstrate that the oil patch has "skin in the game." These negotiations between rail companies and energy firms are ongoing, and we anticipate that the favourable economics of current discounts will support a middle-ground settlement over the coming weeks and months. Indeed, WTI-WCS discounts fall to roughly $22/bbl from more than $30/bbl before rebounding to around $26/bbl, indicating a potential start of the anticipated—though delayed and choppy—oil-by-rail pickup (chart 6). Most of the surplus crude unable to find available rail car capacity has been forced into Alberta tank farms, and inventories have reached their highest level on record (chart 7).

Chart 6

Recent WCS Discount Narrowing May Indicate Nascent Rail Pickup



Source: Scotiabank Economics, Bloomberg.

COSTS OF INACTION: ECONOMIC IMPACT OF STEEPER CANADIAN OIL DISCOUNTS

Western Canada produced roughly 4 million barrels of crude oil per day in 2017, and we expect output growth of more than 200 thousand barrels per day on the back of ramp-ups at Fort Hills and the Horizon project expansion. WCSB production is split fairly evenly between heavy (52%) and light (48%) crude blends, with supply of the latter driven in recent years by the upgrading of bitumen to the status of lighter, sweeter synthetic crude.

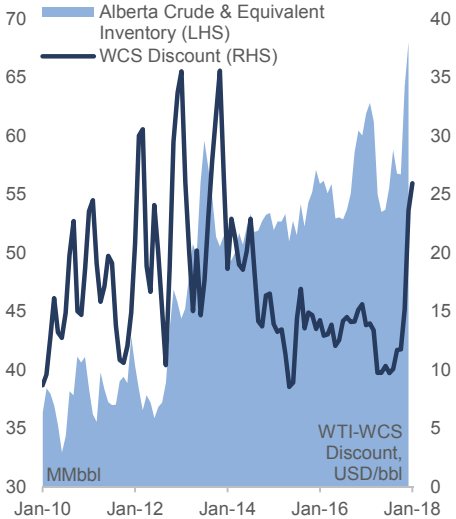
If maintained at current levels, discounts would cost the Canadian economy roughly C$15.6 billion per year, or 0.75% of GDP. As the oil-by-rail pickup continues, we anticipate that WCS discounts will fall to around $18/bbl later this year, which will reduce the opportunity cost to roughly C$10.7 billion in 2018, or 0.5% of GDP (see Table 1 on next page). We estimate that annual losses associated with transporting marginal crude by rail rather than pipeline will settle at C$7 billion (about 0.3% of GDP) in 2019–20 until additional pipeline capacity comes into service.

A number of points flow from this:

The elevated discounts come with a steep economic cost, and represent to a large degree a self-inflicted wound. Reliance on the existing pipeline network and rail shipments to bring Canadian oil to market has a demonstrable impact on Canada's well-being, with consequences that extend well beyond Alberta.

Chart 7

Alberta Inventories Hit Record High



Source: Scotiabank Economics, AER, Bloomberg.

Table 1

Discounts		2-Yr Avg Reference Period (10/15-10/17)	Keystone Outage-To-Date (16 Nov '17 -)	Forecasts: Oil-by-Rail Pickup Senario	Forecasts: Full-Year 2018 Estimate
WTI-WCS	USD/bbl	13	24	18	21.6
WTI-MSW	USD/bbl	3	6	5	5.6
Opportunity Cost*					
Daily	C$ Mil	N/A	35	19	30
Number of Days		N/A	91	365	365
Period Total	C$ Mil	N/A	3,221	6,789	10,776

*Calculated on crude discounts relative to 2-year average refernce period;
W. Canadian supply assumed at 2.1 MMbpd heavy, 2.0 MMbpd Light;
quality discount held constant at US$8/bbl for heavy crude; CADUSD at 0.80.
Source: Scotiabank Economics, NEB, Bloomberg.

Assuming KXL and TMX are completed and enter service, Canadian supply will outstrip pipeline takeaway capacity until at least 2020, implying that an atypical and elevated discount on WCS will prevail until that time.

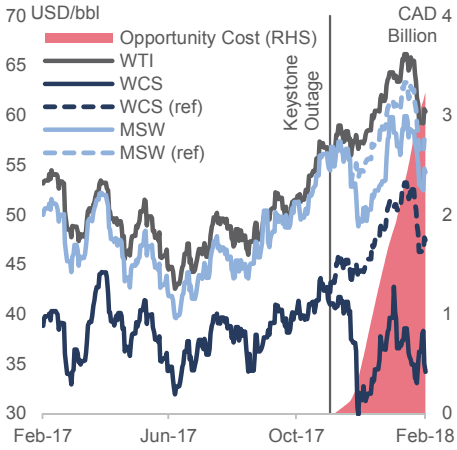
Equally importantly, the excess of production over takeaway capacity implies that the sector remains vulnerable to interruptions in pipeline flow, as experienced in November. Such disruptions could easily send discounts back to their peak levels rather than decline (to elevated levels) as we currently expect.

If either KXL or TMX do not move forward, Canadian production will outstrip pipeline takeaway capacity indefinitely unless other pipeline projects or expansions come to the fore. This implies a need for greater rail shipments, which are currently $5–10 more costly than pipeline egress (Cushing vs USGC), or a cutback in Canadian production levels to one that is consistent with our takeaway capacity. Either of these outcomes are suboptimal from the oil industry's perspective, and could ultimately lead to less activity in the sector, representing a loss to the Canadian economy.

Pipeline approval delays have imposed clear, demonstrable and substantial economic costs on the Canadian economy (chart 8). While some may view these impacts as concentrated in the oil sector and Alberta, the foregone revenue from the steep discounts on Canadian oil have large upstream and downstream effects on a broad section of the Canadian economy and population. **The sooner governments move to allow additional pipeline capacity to be built, the better off Canada will be.**

Chart 8

Opportunity Cost Of Insufficient Pipeline Capacity Rising By The Day



Note: Calculated relative to 2-yr avg crude discounts; W. Cdn supply assumed at 2.1 MMbpd heavy, 2.0 MMbpd Light; CADUSD at 0.80.
Source: Scotiabank Economics, Bloomberg.