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TIR

IMPACT OF LOWER ENERGY PRICES ON THE TIMBERLAND ASSET CLASS

Chung-Hong Fu, Ph.D., *Managing Director*

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Executive Summary

This paper explores the effects of lower energy prices on the timberland asset class and explains how investors and their managers can position themselves to take advantage of the associated market impacts.

There are three primary ways in which a large adjustment in oil prices can impact the performance of timberland investments. Lower energy prices can: (a) raise the price of timber; (b) lower forest management and silvicultural costs; and (c) indirectly affect timber and land markets by influencing the world economy and global trade flows.

Of these, the influence of oil prices on timber prices is likely the most significant because it has direct bearing on a timberland asset's harvest income. In theory, when mills and loggers have lower production costs, they are able to pay higher prices for timber while still maintaining their profit margin targets. In reality, the benefits of lower oil prices in manufacturing are negligible. The exceptions are mills that heavily utilize petroleum-based resins and adhesives in their production processes – like oriented strand board (OSB) manufacturers.

Compared to producers of end-use wood products, loggers tend to feel the impacts of fuel prices on their operating costs to a much greater degree. Among the three major timber producing regions in the U.S., the South shows the strongest correlation between fuel prices and logging costs. According to TIR's analysis, a $10 per barrel drop in the price of oil translates into a $0.60 per ton drop in logging costs in the South. Under the right circumstances, these lower costs could prove beneficial for timberland owners because they can enable logging contractors to either pay higher timber prices or charge less for their harvest and transportation services.

A second way in which declining petroleum prices can have a positive impact on a timberland investment is by helping to reduce silvicultural costs. Forest investments that are being operated under intensive silvicultural regimes that include applying herbicide and fertilizer benefit the most from lower oil prices, while those that are passively managed generally experience little or no benefit. Based on case study in which cash flows from different forest investments were analyzed, TIR determined that intensively-managed forest properties can realize a net gain from lower oil prices that approaches 30 basis points over the life of the investment. This assumes a $50 per barrel decline in oil prices results in a 40 percent reduction in the cost of chemical applications that are used in traditional silvicultural treatments.

Finally, lower energy prices can have either a favorable or unfavorable impact on a timberland investment's performance due to the ripple effects they have on the world economy and global trade flows. However, because the U.S. is a net importer of oil, lower oil prices generally can be expected to have a positive influence on timberland investment performance because lower energy costs tend to drive increased demand for wood, which, in turn, tends to have a favorable impact on timber prices.

Timberland investors can capitalize on declining oil prices by understanding local timber markets and by not underwriting acquisitions with the assumption that future oil prices (and thus silvicutural and timber harvesting and delivery costs) will remain low during the duration of the investment. Investors should favor acquiring and holding properties that are located in micro timber markets that are competitive, characterized by stable or growing mill bases, and that have healthy logging forces, because such holdings are more likely to benefit from the impacts of lower energy costs.

Introduction

The price of crude oil plummeted from more than $105 per barrel during the first half of 2014 to below $60 per barrel before the year closed – a decline of nearly 60 percent (see chart below). At the time of this writing, global oil prices have been volatile, but have remained well below the $80 to $120 per barrel levels that were observed during the last three years. The swiftness and extent of this energy market correction caught many analysts by surprise and the purpose of this white paper is to explore the degree to which it has the potential to impact the timberland investment sector. The paper also examines how investors might position themselves to benefit from lower energy prices. While this work focuses primarily on the impact declining oil prices are having on U.S. timberland investments, the trends and conditions it addresses may be equally relevant in other, timberland investment markets around the world.

Oil Price's Effect on Timber Prices

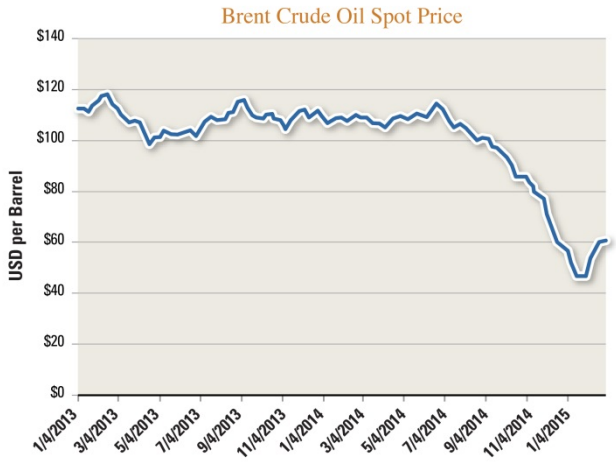

Figure 1. The weekly spot price of Brent Oil (Europe, FOB), the global benchmark price for crude oil, from January 4, 2013 through February 27, 2015. *Source: U.S. Energy Information Administration.*

There are three ways in which a significant change in oil prices can impact the performance of a timberland investment.

Lower energy prices can:

1. Raise the price of timber
2. Lower costs associated with forest management and silvicultural operations
3. Indirectly affect timber and land markets by impacting the world economy and global trade flows

Of these, the effect lower oil prices can have on timber prices is, perhaps, most significant because timber prices have a direct bearing on a timberland asset's income generation potential. This is due to the fact that lower energy prices can reduce marginal costs in downstream markets, specifically for the logging sector and for some wood processors (Figure 2). Lower production costs for loggers and mills mean they can afford to pay more for the timber they buy while still maintaining a focus on their profit margin targets (Figure 3).

Figure 2. Typical value chain for wood products before they become consumer products and enter end-use markets. Note that depending upon the local market, the logging contractor may be (a) hired by the forest owner to deliver wood to the mill; (b) hired by the mill to harvest wood from the forest owner; or (c) an independent wood broker who is buying timber from the forest owner and selling it to the mill.

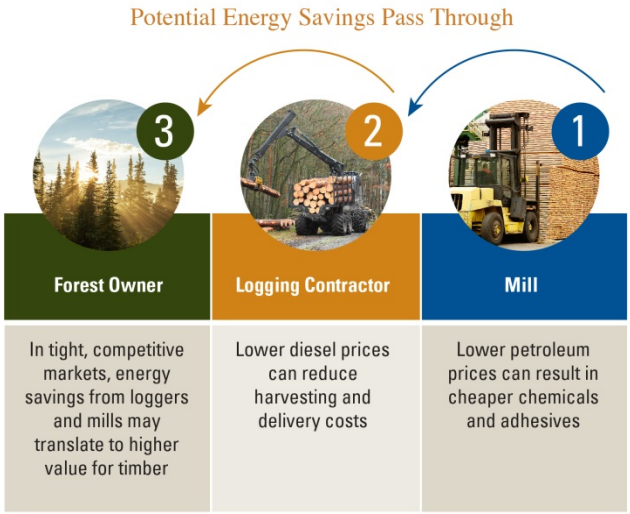

Figure 3. The potential pass-through of savings in unit production costs from upstream markets back to the timberland owner as a result of lower oil prices. The pass-through of cost savings could, under the right competitive circumstances, result in higher realized stumpage prices for the timber producer.

Based on this analysis, a $10 per barrel drop in the price of oil translated into approximately a $0.60 per ton drop in logging costs in the South

Fuel Savings by Loggers

Much of the mechanized equipment used to harvest timber and carry logs to mills relies on diesel fuel. Consequently, a dramatic drop in oil prices should affect logging contractors by reducing their outlays for fuel. To test this assumption, TIR performed a linear regression analysis of the average unit cost of harvested and delivered timber against the spot price of West Texas Intermediate crude oil, which is considered the benchmark price for domestic oil. Among the three major softwood producing regions in the U.S., the South showed the most significant relationship (Table 1). Based on this analysis, a $10 per barrel drop in the price of oil translated into approximately a $0.60 per ton drop in logging costs in the South. This positive association was affirmed when TIR also tested logging costs against gasoline and diesel prices. A statistical R^2 above 0.8 means more than 80 percent of the annual adjustments in the harvest and delivery costs for timber can be explained by changes in fuel prices alone. With a p-value below 0.1 percent, it also indicates that this relationship is statistically significant.

Table 1. Linear regression was performed on the average unit harvest and delivery costs for timber against the annual energy price. The resulting R-square (which measures how much energy prices explain the variation in logging costs) and P-value (the smaller the value, the greater the statistical significance) are shown. Note: the Northeast and Lake States regions are not analyzed because of a lack of available logging cost data. *Data sources: RISI, U.S. Energy Information Administration.*

U.S. Log Harvest and Delivery Cost	Energy Price	Regression R^2	Statistical Significance (p-value)
Pacific Northwest – Coast	WTI Crude Oil (1992-2013)	0.535	0.0001
Pacific Northwest – Inland	WTI Crude Oil (1992-2013)	0.003	0.8185
South	WTI Crude Oil (1992-2013)	0.813	<0.0001
South	Gasoline, U.S. Gulf (1992-2013)	0.831	<0.0001
South	Diesel (2001-2013)	0.846	<0.0001

TIR found that the link between logging costs and energy prices is not as strong in the Pacific Northwest. For the Coastal region, which includes those parts of Washington and Oregon west of the Cascades, the R^2 was 0.535, which means lower petroleum prices only accounted for half of the logging cost adjustments in that area. In the Inland region of the Pacific Northwest, which encompasses regions of Washington, Oregon, Idaho, and Montana east of the Cascades, the relationship breaks down. In this area, energy prices effectively had little or no bearing on logging costs.

The weaker relationship between timber harvesting and energy prices for the Northwest as compared to the U.S. South is most likely due, in part, to logging practice differences in these two regions. Timber harvesting in the Pacific Northwest often entails cable logging, which is more labor intensive because it involves the manual felling of trees on steep slopes. In contrast, much of the logging in the U.S. South occurs on flatter terrain and is therefore a high-speed and more mechanized process – one that makes use of diesel powered feller-bunchers, which cut and lay timber for easy processing and transport. Furthermore, land ownership patterns in the U.S. South are more scattered and parcelized, which can increase transportation distances and the associated costs of delivering logs to mills.

The capacity of mills to realize energy savings from lower oil prices is rather limited

Cost Savings of Mills

Beyond logging and log transport, the second potential source of energy pass-through savings is at mills, where raw logs are processed into primary wood products such as pulp, lumber, panels, and fuel pellets.

In the United States, however, the capacity of mills to realize energy savings from lower oil prices is rather limited. Most manufacturers of wood products rely on either wood residuals, natural gas or electricity for their energy needs. Few, if any mills, utilize petroleum to power their operations. The wood residuals, including bark, wood shavings and sawdust, are byproducts of log processing and are used in boilers to generate both steam and electricity. In the case of natural gas and electricity prices, both largely move independent of oil prices. In fact, only 0.8 percent of the electricity produced in the United States comes from petroleum-fueled generating facilities. Instead, utilities rely primarily on coal (40 percent), natural gas (27 percent), nuclear (19 percent) and hydroelectric (6 percent) fuel sources.[1]

While the operating costs of many mills are not influenced by crude oil prices, there is one exception: producers of composite wood panels. Lower crude oil prices can translate into cheaper chemical prices, particularly for the resins and waxes used in the manufacture of engineered wood panels like oriented strand board (OSB). According to one assessment, a $50 drop in oil prices could lower the unit cost of OSB production by 6 percent.[2] However, the same is not necessarily true for other types of panel products. For example, resin and chemical costs only make up about 5 percent of the cost of plywood. Consequently, declining oil prices do not produce significant benefits for plywood manufacturers.

Realizing the Pass-Through Savings in Timber Markets

Taken together, energy savings from loggers and, in some limited cases, from mills, can cause timber prices to increase. But has that been the case? The manner in which timber markets have responded to the recent

[1] U.S. Energy Information Administration: *Total Electric Power Summary Statistics*, Year-to-Date, Nov. 2014.

[2] Equity Research Associates: *Forest Products Monthly*, January 2015, p. 13.

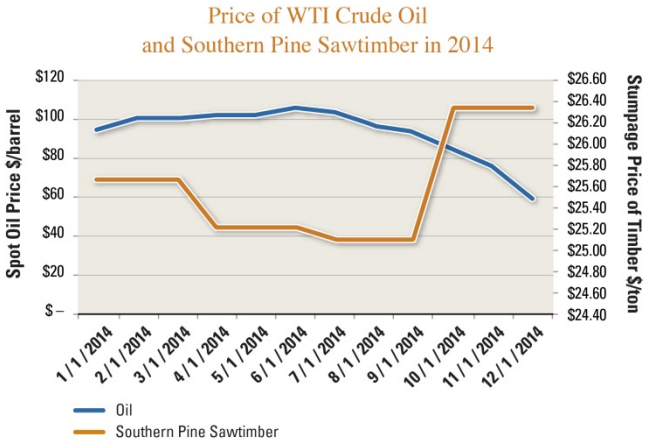

Figure 4. Monthly spot price of WTI crude oil plotted alongside the quarterly stumpage price of Southern Pine Sawtimber for 2014. *Sources: U.S. Energy Information Administration, Timber Mart-South.*

changes in oil prices suggests that there has been some beneficial impact. In the South (see Table 2 and Figure 4), where, again, the strongest association appears to exist, average stumpage prices rose by 42¢ to $1.23 per ton between the third and fourth quarter of 2014. During this time, crude oil prices fell 25 percent – dropping from a third quarter average of $97.78 per barrel to a fourth quarter average of $73.16. The linear regression of harvesting and delivery costs for the U.S. South suggests that a $24.62 drop in oil prices should roughly amount to about $1.48 drop in average logging costs. Considering the fact that the net effect of mill margins is relatively small, this suggests that as much as four-fifths of the energy savings accretive to downstream markets may be reflected in higher timber values. Of course, other market factors can be at play as well. This can include weather, imports, and log inventory levels at mills and processing facilities. However, over the long-run, increased competition for wood resources means that timberland owners will eventually realize these energy cost savings because their timber will be in greater demand and more highly valued.

Table 2. Change in WTI spot price for oil and for the stumpage price of U.S. Southern pine between the third and fourth quarter of 2014. *Sources: Timber Mart-South, U.S. Energy Information Administration.*

Product	2014 Q3 Average Price	2014 Q4 Average Price	$ Price Change	% Price Change
WTI Spot Crude Oil	$97.78/barrel	$73.16	-$24.62	-25.2%
Southern Pine Sawtimber	$25.11/ton	$26.34	$1.23	4.9%
Southern Pine Chip n' Saw	$16.85	$17.59	$0.74	4.4%
Southern Pine Pulpwood	$10.10	$10.52	$0.42	4.2%

The Effect of Oil Prices on Operating Costs

A second potential way in which declining petroleum prices can benefit a timberland investment is through a reduction in silvicultural costs. More specifically, many of the chemicals used in forest management are derived from petroleum-based compounds. These include certain fertilizers and herbicides. Based on anecdotal observations, prevailing market prices for forestry-based fertilizers and herbicides have varied by region because

of the recent decline in oil prices. Overall, price adjustments reportedly range from as little as zero to as much as 40 percent, depending on the product and region.

Even for intensively managed timberlands, such as loblolly pine plantations in the Southern Coastal Plain region, the impact was still modest

To gauge the effect cheaper chemical treatments have on timberland performance, TIR analyzed the degrees to which the performance of a variety of forest assets were influenced by declining fertilizer and herbicide application costs. As is shown in Table 3, the increase in internal rate of return (IRR) depended on the intensity of the forest management regime. Forest properties that utilized advanced silviculture, where significant amounts of herbicide and fertilizer were used, experienced the greatest benefits. While those that were passively managed experienced marginal or no benefits at all. However, even for intensively managed timberlands, such as loblolly pine plantations in the Southern Coastal Plain region, the impact was still modest – with only 28 basis points of additional return (IRR) accruing when the cost of forestry chemical applications fell by 40 percent due to lower energy prices.

Table 3. The estimated benefit in real internal rate of return (IRR) of a typical forest asset (medium productivity) in the United States through a full rotation, before any taxes or manager fees, if the unit cost of herbicide and fertilizer treatments fell by 40 percent as a result of lower petroleum prices. *Source for case study cash flows: RISI Global Tree Farm Economic Review.*

Timberland Type	Rotation Length (years)	Fertilizer Treatment	Herbicide Treatment	Gain in IRR
Loblolly – South Coastal Plain	24	➡	➡	28 bp
Loblolly – South Piedmont Region	28		➡	16 bp
Douglas Fir – Pacific Northwest	45		➡	7 bp
Red Pine – Lake States	70	➡	➡	4 bp
Natural Mixed Hardwoods – Northeast	80			0 bp

The Indirect Effects of Lower Energy Prices

The third and final way in which lower energy prices can impact a timberland investment is through the macro economy and international trade flows. The United States is a net importer of oil, which means that lower energy prices produce a net benefit for the domestic economy because the cost savings tend to migrate to other sectors. In the case of the wood products sector,

this means demand expands when the cost of oil declines.

In addition, a large correction in global oil markets also can generate ripple effects in global trade flows for timber and wood products. This is because the currencies of major oil exporting countries weaken under such circumstances. This has recently occurred in both Russia and Canada, which are not only major energy producers, but also major exporters of timber and wood products. Because of the weakened ruble, for example, Russia is now able to capture increased market share from the U.S. Pacific Northwest by exporting lumber to China. In the case of Canada, the cheaper Canadian dollar makes Canadian paper and lumber mills more cost competitive against their U.S. counterparts.

There are a myriad of indirect and secondary impacts on timber markets caused by declining energy prices, but it is beyond the scope of this paper to account for all of them. It also is not possible to determine their cumulative effect on a forest investment's specific dynamics. Nevertheless, timberland investors should be aware of these impacts and should strive to develop a more informed perspective on the interconnected nature of timber and timberland markets and the global economy.

Conclusions and Recommendations

The beneficial effects of lower energy prices are relatively limited for timberland investors. These benefits are manifested primarily through cost savings experienced by logging contractors. There is little cost saving generated on the mill side of the supply and demand equation, with the possible exception of the engineered wood products sector, where OSB manufacturers rely heavily on resins and chemicals produced from petroleum to manufacture their products.

Where does this leave the timberland investor? In tight wood markets, where there is strong competition for timber and wood fiber, pass-through savings from lower energy costs can generate as much as a 60¢ per ton increase for every $10 that crude oil prices decline. Depending on the forest asset, this could create a measurable increase in timber income, particularly from the sale of lower-valued log products such as pulpwood and woody biomass. For example, if pulpwood prices average $10 per ton in the U.S. South, a sustained $50

drop in crude oil prices can result in $3.00 per ton rise, a gain of 30 percent gain.

Beyond the potential for modestly higher timber prices, timberland investors also can benefit from lower silvicultural costs when oil prices decline. If a timberland asset consists primarily of intensively-managed plantations which require significant applications of herbicide and fertilizer, there could be an incremental increase in return over the long-run, provided energy prices remain low for a significant duration of the investment.

This is the underlying issue at hand. Nobody knows how oil prices will adjust over time. They could quickly recover to their formerly high levels or stay low for an extended period of time. In this climate, timberland investors should strive to understand local timber markets and avoid underwriting new investments with the assumption that oil prices (and thus silvicultural and timber harvesting and delivery costs) will remain low. Investors should, instead, favor micro-markets that are competitive, that enjoy stable or growing mill capacities, and that have healthy logging forces. Markets that have such characteristics are more likely to generate savings from lower energy costs, which, in turn, can be shared by timberland owners.

For questions and additional information, contact:

Chung-Hong Fu
Managing Director of Economic Research and Analysis
Timberland Investment Resources, LLC
1330 Beacon St., Suite 311
Brookline, MA 02446
Phone: (617) 264-4767
E-mail: fu@tirllc.com

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