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The Shrinking Lifo Reserve: A Look at the Integrated Oil Companies Executive Summary

In a 2008 study, *The Potential Consequences of the Elimination of LIFO as a Part of IFRS Convergence*, using data for 2007, we looked at the potential effects on net income, the balance sheet and income taxes due of a proposed move away from LIFO. While in that study we were not focused on oil companies, oil firms dominated our sample. We noted at the time that with sizable LIFO reserves, a shift to FIFO would result in significant incremental income taxes.

Oil prices were quite high in 2007 and have declined precipitously since. For this study we are interested in revisiting the LIFO reserve question. That is, do the integrated oil firms still report sizable LIFO reserves? Has the LIFO reserve been eliminated for some firms? What is the effect on 2015 pre-tax income of a decline in the LIFO reserve?

For a sample of twelve integrated oil companies that employ the LIFO method we find that the LIFO reserve has declined significantly. For five of the twelve firms, it has declined to zero. Across the entire sample, the LIFO reserve has declined to .91% of total assets at 2015 from 9.44% in 2007. During 2015, the decline in the LIFO reserve had a positive effect on earnings. In an absence of the decline in the LIFO reserve, 2015 pre-tax income would be lower by 15%.

Using 2007 data, a shift to FIFO for the integrated oil companies would have resulted in an incremental tax bill of approximately 3.3% of total assets – a significant tax windfall for the federal government. At 2015, that incremental tax bill is all but eliminated, having been reduced to .32% of total assets. While a rise in oil prices will replenish the LIFO reserve once again, at least for now, for the integrated oil companies, the LIFO reserve has been all but eliminated.

June 2016

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The Georgia Tech Financial Analysis Lab conducts unbiased research on issues of financial reporting and analysis. Unbiased information is vital to effective investment decision-making. Accordingly, we think that independent research organizations, such as our own, have an important role to play in providing information to market participants.

Because our Lab is housed within a university, all of our research reports have an educational quality, as they are designed to impart knowledge and understanding to those who read them. Our focus is on issues that we believe will be of interest to a large segment of stock market participants. Depending on the issue, we may focus our attention on individual companies, groups of companies, or on large segments of the market at large.

A recurring theme in our work is the identification of reporting practices that give investors a misleading signal, whether positive or negative, of corporate earning power. We define earning power as the ability to generate a sustainable stream of earnings that is backed by cash flow. Accordingly, our research may look into reporting practices that affect either earnings or cash flow, or both. At times, our research may look at stock prices generally, though from a fundamental and not technical point of view.

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Introduction

For companies that use the last-in, first-out, or LIFO method of inventory costing, recent purchase costs are reflected currently in cost of goods sold while older purchase costs are used to value ending inventory. In contrast, the first-in, first-out or FIFO method uses more recent purchase costs in the valuation of ending inventory, while older purchase costs are employed in the calculation of cost of goods sold. In a rising price environment, LIFO firms report higher cost of goods sold, lower gross profit and lower taxable income than had they used FIFO. For firms using the LIFO method, the LIFO reserve represents the difference between the valuation of ending inventory valued on a LIFO basis versus the valuation of that inventory on a first-in, first-out or FIFO method. In effect, the LIFO reserve reflects an undervaluation of inventory on the balance sheet and the cumulative reduction in taxable income enjoyed by the firm.

In 2008, in a study titled, *The Potential Consequences of the Elimination of LIFO as a Part of IFRS Convergence*, we looked at the potential effects on net income, the balance sheet and income taxes due of a proposed move away from LIFO. At the time, there was much talk about the use of International Financial Reporting Standards (IFRS) as a replacement for U.S. GAAP. IFRS does not permit the use of LIFO. As such, there was understandable concern that a switch away from LIFO in the U.S. may be mandated. While our focus for that earlier study was on the 30 companies with the largest LIFO reserve measured as a percentage of total assets, we found that oil and gas companies, an industry that includes many firms that employ the LIFO method, dominated our sample.

For example, Exhibit 1 below presents excerpts from an exhibit of that earlier study. In the exhibit, we detail the 2007 LIFO reserve for the six oil and gas firms in the sample and the amount of income taxes that potentially would be due if a switch to FIFO were to be mandated. As presented in the exhibit, the LIFO reserve for these companies is large, ranging up to \$25.4 billion for Exxon Mobil Corp. Similarly, the potential taxes that would be due on a switch to FIFO are significant, ranging up to 11% and averaging 5.5% of total assets, assuming a 35% federal tax rate.

Exhibit 1. LIFO Reserves as a Percentage of Total Assets and Cumulative Taxes Due from A Switch to FIFO. Select Oil and Gas Firms. Data from 2008 Study.

Company	2007 LIFO Reserve % Total Assets	2007 Total Assets	2007 LIFO Reserve	Cumulative Taxes due on Switch to FIFO	Taxes due % Total Assets
Exxon Mobil Corp.	10%	242,082	25,400	8,890	4%
Holly Corp.	12%	1,664	199	70	4%
Marathon Oil Corp.	9%	42,746	4,034	1,412	3%
Sunoco Corp.	31%	12,426	3,868	1,354	11%
Tesoro Co.	17%	8,128	1,400	490	6%
Valero Energy Corp.	15%	42,722	6,200	2,170	5%
Median	13.5%				5.5%

Source: *The Potential Consequences of the Elimination of LIFO as a Part of IFRS Convergence*, Financial Reporting and Analysis Lab, Georgia Tech, December 2008.

Because the LIFO reserve measures the difference between inventories valued using recent or current purchase costs and past purchase costs, changes in current costs can impact the size of the LIFO reserve. Rising prices will increase the reserve. Falling prices will decrease it.

In recent years, talk of a wholesale move to IFRS by U.S. companies has dimmed. Nonetheless, we thought that it would be insightful to measure the effects on the LIFO reserve of oil and gas companies arising from recent declines in oil prices. Several questions are raised. For example, do these companies still report sizable LIFO reserves? Have current costs fallen so much that they have dipped below past purchase costs, completely eliminating the LIFO reserve?

For LIFO firms, increases in inventory purchase costs serve to increase the LIFO reserve and are reflected as an increase in cost of goods sold, lowering pre-tax income compared to what pre-tax income would be on a FIFO basis. When the LIFO reserve declines, however, due, for example, to declining prices, that decline in the LIFO reserve serves to reduce cost of goods sold relative to FIFO and boosts pre-tax income. Thus, while declining oil prices have a negative effect on oil firms' revenues and earnings, for those companies that employ LIFO, that decline in revenues and earnings is offset, at least in part, by a decline in cost of goods sold. It is a useful counter-cyclical effect of LIFO. Those who argue against the use of LIFO as being simply a tax dodge lose sight of this fact. For a more meaningful measure of income for purposes of analysis of performance, LIFO is precisely the correct method to use when prices, such as those related to commodities, have a tendency to change rapidly. This discussion raises another question. In particular, what is the effect of a 2015 decline in the LIFO reserve on pretax income for the oil companies employing LIFO?

Design

Using data provided by the Federal Reserve Bank of St. Louis, at December 31, 2007, when we compiled data for the original study, oil, measured as West Texas Intermediate, was \$95.95 per barrel. At December 31, 2015, that same oil was priced at \$37.13 per barrel – a sizable decline.

To measure the effect on the LIFO reserve of this decline in the price of oil, we identify a sample of integrated oil companies using the Global Industrial Classification System (GICS), in particular GICS # 10102010. We limit our sample to companies with market caps in excess of \$100 million that employ LIFO for at least a portion of their inventories. Limited liability partnerships are excluded.

Interestingly, we note that several companies among the integrated oils do not employ the LIFO method, using FIFO or average cost instead. In our preliminary sample, these non-LIFO firms are Clayton Williams Energy, Inc., CVR Energy, Inc., Hess Corp., Murphy Oil Corp. and Par Pacific Holdings, Inc. Excluding these firms, our final sample consists of twelve companies.

From the Form 10-K annual report filings for our sample of twelve integrated oil firms, we collect select financial data consisting of, for 2015, total assets, revenue, pre-tax income, and for 2014 and 2015, the LIFO reserve.

Under U.S. GAAP, inventory may not be carried at an amount that is greater than market value. If current cost falls below purchase cost, the inventory must be written down in what is termed a lower-of-cost-or-market (LCM) adjustment.¹ The offsetting charge is recorded in cost of goods sold. Later, if current cost recovers, under U.S. GAAP, that inventory may not be written up.² In a significant falling price environment, it is possible that not only is the LIFO reserve wiped out, but a LCM reserve may be needed whereby inventory is carried at a current cost amount that is less than purchase cost. When a LCM reserve is recorded, there is no longer a difference in the valuation of inventory on a LIFO or FIFO basis because both methods would report inventories at current cost. Among our sample companies, if in 2014 or 2015 a company reports a LCM reserve, the amount of that reserve is noted.

Results

Results are presented in Exhibit 2. The exhibit lists each of the integrated oils in alphabetical order, with total assets, revenue, and pre-tax income for 2015. The LIFO reserve, that is, the difference between past purchase cost and current cost for 2014 and 2015, with the change in the reserve from 2014 to 2015 is also listed. Note that for eleven of the twelve LIFO firms, the reserve shows a decline in 2015 – not an unexpected finding given the decline in oil prices observed during

¹ Market here refers to replacement cost (i.e., current cost), but an amount that may not exceed net realizable value (i.e., selling price less costs of completion and disposal) or fall below net realizable value less a normal profit margin.

² As an aside, if replacement cost recovers, International Financial Reporting Standards (IFRS) do permit a write-up of inventory back to cost.

2015.³ Western Refining, Inc. actually saw its LIFO reserve increase. A possible explanation for this unexpected result is that the company's physical quantity of inventories increased.⁴

Because they carry a LCM reserve in both 2014 and 2015, three of the LIFO firms, Hollyfrontier Corp., PBF Energy, Inc. and Tesoro Corp., do not report a LIFO reserve in either year. For these firms, inventory is carried at current cost in both 2014 and 2015. For them, there is no difference between LIFO and FIFO valuations for their inventory. Two firms, Marathon Petroleum Corp. and Valero Energy Corp., report a LIFO reserve in 2014 but not in 2015. In 2015, these firms report a LCM reserve. That is, the decline in oil prices during 2015 lowered the current cost of their inventories below purchase cost, eliminating the LIFO reserve that year. For these two companies the LIFO reserve effectively declined to zero in 2015.

For the nine firms that report a LIFO reserve at the end of 2014, we can measure the average decline in the LIFO reserve during 2015. That average, represented by the median, is 39.09%. That is, for companies reporting a LIFO reserve in 2014, the median decline in the reserve during 2015 is 39.09%. Eight of the nine firms reporting a LIFO reserve in 2014 saw the reserve decline during 2015. For these firms, the decline in the reserve reflects the effects on costs of goods sold of charging against revenues current costs that are lower than past purchase costs, in the computation of pre-tax income. That is, these firms are hurt by declining revenues, but helped by declining cost of goods sold. The median positive effect on pre-tax income of the decline in the LIFO reserve during 2015 is 15%. That is, absent the decline in the LIFO reserve, these companies would have reported pre-tax income in 2015 that was 15% lower than what was actually reported.

³Using data from the Federal Reserve Bank of St. Louis, the per-barrel price of West Texas Intermediate declined from \$53.45 at December 31, 2014 to \$37.13 at December 31, 2015.

⁴Western Refining, Inc. reports both a LIFO reserve and a LCM reserve at 2014 and 2015. Recall from footnote 1 that in the context of an LCM adjustment, market value refers to current or replacement cost, but limited to a ceiling equal to net realizable value and a floor equal to net realizable value less a normal profit margin. One possible explanation for the company to carry a LIFO reserve and a LCM reserve is that the company has some inventories with current costs that exceed LIFO cost and other inventories with LIFO cost that exceeds market value. It is also possible that in this example, net realizable value is less than current cost.

Exhibit 2. LIFO Reserve, LCM Reserve, and Effects on 2015 Pre-Tax Income of Change in LIFO Reserve. Integrated Oil Companies. Dollar Amounts in Millions.

Company	Total Assets	Revenue	Pre-Tax Income	LIFO Reserve		Inc (Dec) in LIFO Reserve	Inc (Dec) in LIFO Reserve as Percent of 2014 LIFO Reserve	Pre-Tax Income Adjusted for Inc (Dec) in LIFO Reserve	Percent Inc (Dec) in Pre-Tax Income Adjusted for Inc (Dec) in LIFO Reserve	LCM Reserve	
				2014	2015					2014	2015
Alon USA Energy	\$2,176	\$4,338	\$130	\$25	\$18	(\$7)	-28.00%	\$123	-5.38%		
Chevron Corp.	266,103	138,477	4,842	8,100	3,700	(4,400)	-54.32%	442	-90.87%		
Delek US Holdings	3,325	5,762	27	70	51	(19)	-27.08%	8	-69.74%		
Exxon Mobil Corp.	336,758	268,882	21,966	10,600	4,500	(6,100)	-57.55%	15,866	-27.77%		
Hollyfrontier Corp	8,388	13,238	1,209	0	0	0	0.00%	1,209	0.00%	\$398	\$625
Imperial Oil, Ltd.	43,170	26,756	1,923	857	427	(430)	-50.18%	1,493	-22.36%		
Marathon Petrol. Corp.	43,115	72,258	4,374	684	0	(684)	-100.00%	3,690	-15.64%	0	370
PBF Energy, Inc.	6,105	13,123	282	0	0	0	0.00%	282	0.00%	690	1117
Phillips 66	48,580	100,949	6,044	3,000	1,300	(1,700)	-56.67%	4,344	-28.13%		
Tesoro Corp.	16,332	28,711	2,630	0	0	0	0.00%	2,630	0.00%	42	359
Valero Energy Corp.	44,343	87,804	5,971	857	0	(857)	-100.00%	5,114	-14.35%	0	790
Western Refining	5,833	9,787	838	28	198	170	598.59%	1,008	20.29%	175	79
Median							-39.09%		-15.00%		

Source: Annual report filings on Form 10-K to the Securities and Exchange Commission.

In the earlier 2008 study, we looked at the level of the LIFO reserve at Dec. 31, 2007 for a sample of six oil firms. That was a time when oil prices, measured by West Texas Intermediate, were priced at \$95.95 per barrel. At the time, the LIFO reserve equaled 13.5% of total assets. Further, in that earlier study, we estimated that these firms would owe significant additional income taxes, equal to approximately 5.5% of total assets, if they were forced to abandon the LIFO method.

We expanded this analysis to our current sample of twelve integrated oil companies. At Dec. 31, 2015, West Texas Intermediate is priced at \$37.13 per barrel, a 61.3% decline from 2007. Referring to Exhibit 3 we see that five of our twelve sample companies have no LIFO reserve. Across the sample, the median LIFO reserve as a percentage of total assets is .91%. Amounts were quite different for this group of companies in 2007. At that time, the LIFO reserve comprised 9.44% of total assets.

The decline in the LIFO reserve between 2007 and 2015 is notable. Consider, for example, Exxon Mobil Corp. In 2007 the LIFO reserve was reported at \$25,400 million. In 2015, that amount is \$4,500 million. For Chevron, the LIFO reserve declined from \$7,000 million to \$3,700 million

between 2007 and 2015. Similarly, Marathon Petroleum saw the LIFO reserve decline from \$4,034 million in 2007 to \$0 in 2015.

It could be argued that a mandated shift to FIFO for all LIFO companies would provide a tax windfall for the federal government. Referring to Exhibit 3, that argument was a strong one in 2007, where the estimated taxes due on a shift to FIFO was 3.3% of total assets. In 2015, however, the estimated tax due on a shift to FIFO is only .32% of total assets. For some firms, the numbers are large. At Exxon Mobil, for example, in 2007, a shift to FIFO would have resulted in an estimated tax bill of \$8,890 million. That bill in 2015 would be \$1,575. For Chevron, the estimated tax bill resulting from a shift to FIFO declined from \$2,450 million in 2007 to \$1,295 in 2015. At Marathon Petroleum, the estimated tax bill resulting from a shift to FIFO in 2007 was \$1,412 million. In 2015, the estimated tax bill is zero. In fact, a shift to FIFO for five of the companies would result in no incremental tax at all.

Exhibit 3. LIFO Reserve and Estimated Taxes Due on Switch to FIFO, Expressed as Percent of Total Assets, 2015 and 2007. Integrated Oil Companies. Dollar Amounts in Millions.

Company	2015 LIFO Reserve	2015 LIFO Reserve as Percent of Total Assets	2007 LIFO Reserve	2007 LIFO Reserve as Percent of Total Assets	2015 Est. Taxes Due on Switch to FIFO	2015 Est. Taxes Due as Percent of Total Assets	2007 Est. Taxes Due on Switch to FIFO	2007 Est. Taxes Due as Percent of Total Assets
Alon US Energy	\$18	0.83%	\$137	8.65%	\$6	0.29%	\$48	3.03%
Chevron Corp.	3,700	1.39%	7,000	4.70%	\$1,295	0.49%	\$2,450	1.65%
Delek US Holdings	51	1.53%	48	3.85%	\$18	0.54%	\$17	1.35%
Exxon Mobil Corp.	4,500	1.34%	25,400	10.49%	\$1,575	0.47%	\$8,890	3.67%
Hollyfrontier Corp	0	0.00%	199	11.98%	\$0	0.00%	\$70	4.19%
Imperial Oil, Ltd.	427	0.99%	1,953	11.99%	\$149	0.35%	\$684	4.20%
Marathon Petrol. ^a	0	0.00%	4,034	9.44%	\$0	0.00%	\$1,412	3.30%
PBF Energy, Inc. ^c	0	0.00%	NA	NA	\$0	0.00%	NA	NA
Phillips 66 ^b	1,300	2.68%	6,668	3.75%	\$455	0.94%	\$2,334	1.31%
Tesoro Corp.	0	0.00%	1,400	17.22%	\$0	0.00%	\$490	6.03%
Valero Energy	0	0.00%	6,200	14.51%	\$0	0.00%	\$2,170	5.08%
Western Refining	198	3.40%	256	7.19%	\$69	1.19%	\$90	2.52%
Median		0.91%		9.44%		0.32%		3.30%

Source: Annual report filings on Form 10-K to the Securities and Exchange Commission.

^aCompany was Marathon Oil Corp. in 2007.

^bCompany was ConocoPhillips in 2007.

^cCompany was founded in 2008. Data for 2007 are not available.

Conclusion

In a 2008 study, *The Potential Consequences of the Elimination of LIFO as a Part of IFRS Convergence*, using data for 2007, we looked at the potential effects on net income, the balance sheet and income taxes due of a proposed move away from LIFO. While in that study we were not focused on oil companies, oil firms dominated our sample. We noted at the time that with sizable LIFO reserves, a shift to FIFO would result in significant incremental income taxes.

Oil prices were quite high in 2007 and have declined precipitously since. For this study we are interested in revisiting the LIFO reserve question. That is, do the integrated oil firms still report sizable LIFO reserves? Has the LIFO reserve been eliminated for some firms? What is the effect on 2015 pre-tax income of a decline in the LIFO reserve?

For a sample of twelve integrated oil companies that employ the LIFO method we find that the LIFO reserve has declined significantly. For five of the twelve firms, it has declined to zero. Across the entire sample, the LIFO reserve has declined to .91% of total assets at 2015 from 9.44% in 2007. During 2015, the decline in the LIFO reserve had a positive effect on earnings. In an absence of the decline in the LIFO reserve, 2015 pre-tax income would be lower by 15%.

Using 2007 data, a shift to FIFO for the integrated oil companies would have resulted in an incremental tax bill of approximately 3.3% of total assets – a significant tax windfall for the federal government. At 2015, that incremental tax bill is all but eliminated, having been reduced to .32% of total assets. While a rise in oil prices will replenish the LIFO reserve once again, at least for now, for the integrated oil companies, the LIFO reserve has been all but eliminated.