



LIFTING THE CRUDE OIL EXPORT BAN: THE IMPACT ON U.S. MANUFACTURING

By Thomas J. Duesterberg, Donald A. Norman and Jeffrey F. Werling

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EXECUTIVE SUMMARY

The manufacturing sector is an important source of strength in the U.S. economic recovery. The surging oil and gas production sector, in turn, is a major reason behind the manufacturing sector's robust performance since 2010. This paper employs the Inforum LIFT economic forecasting model to analyze how removing the ban on crude oil exports could add to growth in manufacturing by stimulating higher levels of oil production in the United States. Two scenarios are presented and contrasted with a baseline derived from EIA's base economic projections, a low export case (up to 2 million barrels per day [b/d] at peak year in additional oil production) and a high export case (which would average 2 million b/d and reach a peak of 3.25 million b/d). Higher levels of oil production require higher investment expenditures for capital equipment and construction, which in turn boost overall demand for goods. This stimulates the manufacturing sector and its supply and distribution chains. The resulting improvement in income and employment boosts the economy significantly. Consider several figures from the high export scenario. In that alternative, we have the following highlights:

Macroeconomic Benefits

- GDP is higher by 0.93 percent or about \$165 billion in 2019-2021, and levels off around 0.74 percent higher or \$141 billion in 2025.
- 630,000 jobs added at peak in 2019.
- Real Household Income higher by \$2,000 to \$3,000 per household in 2025, an increase of 2.2 percent, and reaches peak of 2.5 percent on a per household basis in 2019.

Industrial Sector Gains

- Production of Durable Goods and materials gains 1.4 percent (\$8 billion) by 2017.
- Machinery production gains 3.3 percent (\$12.4 billion) in 2017.
- Agriculture, Mining, and Construction Equipment gains 6 percent (\$6.1 billion) in 2017.
- Jobs in Mining (including oil and gas) up by average 43,000 per year through 2025.
- New Construction jobs peak at 216,000 in 2017.
- All Manufacturing jobs see average gain of 37,000 per year through 2025.
- Related Professional Services jobs increase by average 148,000 per year through 2025.
- Capital Investment for Machinery—exploration and development—up by \$7 billion in 2020 and for construction and mining machinery by \$3.6 billion.

In contrast, the refinery sector, because of slightly higher prices for light crude oil, sees its capital investment slip by almost \$1 billion in 2020 from the baseline. Some manufacturing exports are also marginally reduced from the baseline by the effects of higher wages, inflation, and the real value of the dollar. Increased employment, especially good paying semi-skilled production jobs and related engineering and professional services jobs, higher capital investment, and increased production of oil and associated natural gas all combine to strengthen U.S. manufacturing if the crude oil ban is lifted. And strong manufacturing is one key to quickening the pace of economic growth in the United States.

INTRODUCTION

Despite the fact that the U.S. economy is well into its fifth year of recovery from the Great Recession, many indicators of strength in the economy are lackluster. The current recovery is the weakest on record dating back to the 1930s. Expansion of employment, investment, wages, labor participation rates, productivity, and

consumer confidence are all substandard in relation to historical patterns. Public opinion polls reflect profound uneasiness with the state of the economy and prospects for the future, especially among young people just entering labor markets.

One of the economic bright spots in the United States since 2010 has been, surprisingly to many analysts, the manufacturing sector. While U.S. manufacturing has been repeatedly challenged by more competition—Japan, the Asian Tigers, the BRICS (Brazil, Russia, India, China)—it has found ways to survive and prosper. Strong productivity growth, keeping costs under control, and retaining a technological edge have helped the sector recoup lost ground and, in the last four years, start to increase employment, export competitiveness, and leadership in such technology-dependent industries as electronics, aerospace, and heavy machinery. A recent study by The Boston Consulting Group, *The Shifting Economics of Global Manufacturing: How Cost Competitiveness Is Changing Worldwide*, identifies the reasons for the resurgence and calls the United States a “rising global star” in manufacturing.¹ Manufacturing production in the United States grew at a 4 percent annual rate in the first half of 2014, while the overall economy advanced only 1.0 percent. Productivity growth in manufacturing far outpaces that in the overall business sector. Projections for 2014-2016 by the MAPI Foundation indicate that this above-average growth will continue to power the rest of the economy.² Manufacturing lost 2.3 million jobs in the 2008-2009 recession. Since February 2010, 705,000 jobs or 31 percent of jobs lost have been recovered. Further, these jobs carry above-average wages and benefits.

One of the most important drivers of a robust domestic manufacturing sector is the U.S. oil and gas production boom of the last five years.³ U.S. industry is a huge consumer of energy—up to one-third of all energy used in the United States goes into the sector. It also is a leader in the infrastructure equipment—drilling rigs, turbines, pumps, pipes, construction equipment, etc.—needed for exploration, production, transportation, and processing of oil and natural gas. Natural gas production has led the energy resurgence, and this resource is especially important as an input to sectors such as chemicals, metals, glass, and cement. The cost advantage from natural gas has already brought massive new investments to the United States in these industries and has helped the overall manufacturing sector enhance its cost advantage over competing countries, especially in Europe and Asia which must import most of their natural gas and oil.⁴

Less well understood is the importance of oil production to manufacturing. Although of course widely used in transportation and refining, it is only in the last few years that U.S. crude oil production has expanded to a point where its importance to manufacturing is worth a reassessment. Because of constraints in domestic refining (explained below), much of the potential growth in crude oil production will not be realized unless global markets can be accessed. According to many studies, we are fast approaching a tipping point where growth in U.S. crude oil production will be economically challenged, unless the long-standing ban on exports of crude is lifted.⁵ The boom in oil production has been a boon to manufacturing due not only to its impact on the growth of GDP but also because U.S. industry is highly competitive in producing the capital equipment used to develop shale resources. In addition, the United States has a dominant competitive position on the technical expertise required for extracting oil from shale formations. Also, much of the new natural gas being produced in recent years comes from oil drilling (natural gas prices are too low to spur much new drilling for this resource alone) so increasing the production of oil is currently very important if we are to maintain an abundant and stable supply of natural gas.

This study assesses the importance of increased oil production on manufacturing, and especially the potential impact of spurring even more production by opening global markets to U.S. crude oil. We will argue that the combination of increased oil and gas production likely to be spurred by lifting the export ban, and the associated increase in manufacturing can provide a substantial boost to U.S. economic growth over the next few years.

¹ Sirkin, et al., *The Shifting Economics of Global Manufacturing: How Cost Competitiveness Is Changing Worldwide*, The Boston Consulting Group, August 2014. See also the August 2013 BCG report by the same authors, *The U.S. as One of the Developed World's Lowest-Cost Manufacturers: Behind the American Export Surge*.

² Daniel J. Meckstroth, “U.S. Industrial Outlook: Growth Mode,” MAPI Foundation, September 9, 2014.

³ Sirkin, *op. cit.*, and see also Thomas J. Duesterberg, *The Manufacturing Resurgence: What It Could Mean for the U.S. Economy*, The Aspen Institute, March 2013.

⁴ The American Chemistry Council notes that in the United States over 204 separate projects, representing cumulative capital investment of \$126 billion have been announced in recent years. Sixty-four percent of these projects involve foreign direct investment. See American Chemistry Council and “Economic Trends,” September 26, 2014.

⁵ See Charles K. Ebinger and Heather Greenley, *Changing Markets: Economic Opportunities from Lifting the U.S. Ban on Crude Oil Exports* (Washington, DC: Brookings Institution, 2014) Policy Brief 14-02, pp. 23-28.

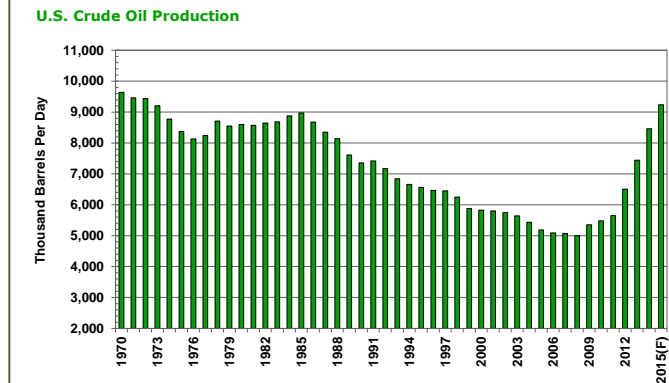
BRIEF HISTORY

In the wake of the 1973 Arab oil embargo, Congress enacted a ban on the export of crude oil. The ban on oil exports was largely academic in that the United States was becoming increasingly reliant on crude oil imports. In 1973, the United States imported an average of 3.2 million barrels of crude oil per day (million b/d) and 3.0 million b/d of petroleum products. By 2005, crude oil imports had more than tripled to 10.1 million b/d while petroleum product imports had risen to 3.6 million b/d. Reliance on oil and product imports as a percent of total petroleum consumption increased from 36 percent in 1973 to 66 percent in 2005.

Thanks to the hydraulic fracturing-directional drilling revolution, by August 2014 oil production was 3.5 million b/d above its January 2008 level. On the demand side, total petroleum use through the first seven months of 2014 was 1.8 million b/d lower than in 2007, the year prior to the start of the Great Recession. As a result of increased production and falling consumption, crude oil imports during the first seven months of 2014 were 4.2 million b/d lower than their average level for all of 2007. Total petroleum imports during the first seven months of 2014 were equivalent to 49 percent of consumption, down from 66 percent in 2005. Petroleum imports net of exports of refined products and very small quantities of crude oil (mainly to Canada where exports of Alaskan crude are permitted) were equal to just 28 percent of domestic consumption for the first eight months of 2014.

The U.S. Energy Information Administration's (EIA) 2014 baseline *Annual Energy Outlook* projects that in 2020 crude oil production will reach 9.6 million b/d (Figure 1). Domestic consumption will total 19.5 million b/d in 2020 and then decline thereafter through 2040. Under higher growth scenarios (see the section on methodology on page 6), production could reach 30 percent or more than is now projected. A major incentive to increase domestic crude oil production would of course be opening sales to global markets by removing the ban on exports. Many opposed to ending the ban are concerned that doing so would result in higher prices for petroleum products—especially gasoline. We will show why this argument lacks merit. Moreover, ending the ban would generate considerable benefits for the overall U.S. economy as well as the manufacturing sector.

Figure 1: Downward Trend in U.S. Oil Production Turned Up Sharply After 2008



Source(s): U.S. Energy Information Administration



WHY EXPORT CRUDE OIL?

Given that U.S. crude oil imports currently total 7.4 million b/d, one might ask why there is a push to export any oil. That is, why don't we simply use new production of crude in U.S. refineries and thereby further reduce our reliance on crude oil imports?

The reason for allowing exports is primarily that not all oil is the same. Most of the increased production in recent years has been in the form of lighter ("sweet") crude oil. Unfortunately, this type of oil is not well-suited for U.S. refineries. U.S. refiners have invested over \$85 billion in the last 25 years to reconfigure their plants so that they can efficiently process heavier crude oil slates because this oil sells at a discount and has been increasingly available to U.S. refineries. Much of this heavy oil originates in Canada, Mexico, and Venezuela. These refineries can process lighter slates of crude oil, but given the way they have been configured, their efficiency, in terms of the yields of petroleum products like kerosene, light diesel oil, heating oil, and heavy diesel oil would fall.⁶

⁶ For a thorough discussion of U.S. refining capacity, including the types of oil used in domestic refineries, see IHS Global Insight, *U.S. Crude Oil Export Decision Assessing the Impact of the Export Ban and Free Trade on the U.S. Economy* (Houston: IHS Global Insight, 2014), especially Chapter III.

Refiners eventually will have to make new investments to upgrade existing refineries and when they do they have the option of reconfiguring them so that they can process lighter slates of crude oil. But the required investments to do this are very sizable. Further, given that many refiners have already made investments that enable them to process heavier slates of crude oil that sells at a discount, it will take years before overall U.S. refining capacity changes significantly so that the growing production of domestic light oil coming from shale formations can be efficiently processed.

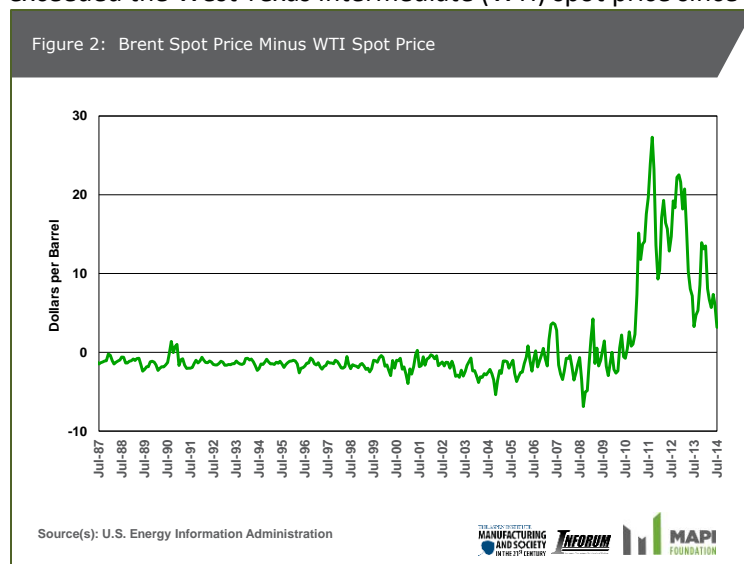
Economically, then, it makes more sense to export light crude oil to Europe and Asia where more refineries are configured to handle light oil. Light oil sells at premium compared to heavier oil in world markets. In the United States, however, the refinery mismatch means that light oil sells as a significant discount relative to heavier, imported oil. The current price for light oil in the United States makes the development of some shale plays less economic. Once producers are free to export crude oil to markets abroad where it is more highly valued, the incentive to further develop these resources will be significantly increased.

There are three other compelling reasons to consider exporting crude oil. First, the United States has been, since the Bretton Woods Accord after World War II, a leader in promoting the unfettered global exchange of goods and services. The post-war free trade era has been one of consistent and strong economic growth, which has extended prosperity to an ever-widening share of the global population. The oil export ban is a serious flaw in the U.S. record of support for the Bretton Woods system. Second, in the current climate in which many of our best allies are dependent on Russian supplies of oil and gas, increasing U.S.-sourced resources in the global marketplace will be of great benefit in reducing such dependence. And, finally, as we will show in the paper, lifting the ban on U.S. exports will spur production of oil (and affiliated gas) and will strengthen the U.S. manufacturing economy. In summary, as Harvard economist Lawrence Summers recently argued: “The merits [of lifting the outright ban on crude oil exports] are as clear as the merits with respect to any significant public policy issue that I have ever encountered.”⁷

INCREASED OIL PRODUCTION AND THE SPOT PRICE OF OIL

The price of crude oil is determined by supply and demand. On a day-to-day basis, various factors including weather, inventory reports, changes in the value of the dollar, economic reports signaling an upturn or downturn in the economy, a terrorist action that halts production, and changes in the amount of excess worldwide production capacity, can cause the price of oil to fluctuate around its long-term trend.

Daily spot oil prices reflect the confluence of all these factors. Light crude oil currently is selling in the United States at spot prices that are below the world price of oil. As shown in Figure 2, the Brent spot price has exceeded the West Texas Intermediate (WTI) spot price since November 2010. The Brent spot



price is a better indicator of the cost of incremental (imported) oil supplies. In addition, domestic gasoline prices track the Brent spot more closely than they do the WTI spot price.⁸

This was not always the case. From May 1987 through the end of 2010, the long-term difference between these two spot prices averaged \$1.37 per barrel and, during this period, it was the WTI price that was at a premium compared to the Brent price. The gap between these two prices expanded after 2010, reaching as high as \$27.31 per barrel in September 2011. Even with the decline in the difference in recent months, the gap between these two prices averaged \$13.64 from January 2011 through July 2014.

There are two reasons why the WTI spot price is currently so far below the Brent spot price. First, due to the surge in oil production,

⁷ “Larry Summers Argues Case for Lifting the Crude Oil Export Ban,” Fred Dews, *Brookings Now*, September 9, 2014.

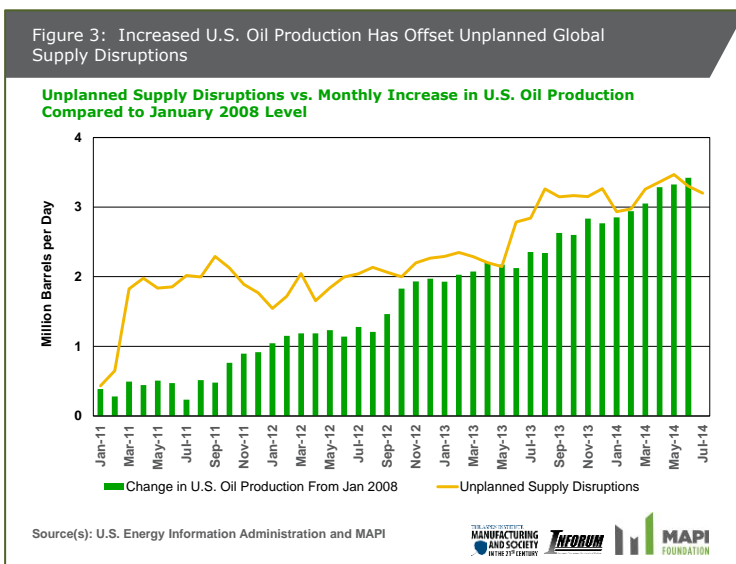
⁸ Donald A. Norman, “Shedding the Light: Should the United States Export Crude and Petroleum Products?” MAPI, *Issues in Brief*, March 5, 2014.

especially from new oil shale plays in the Northern Great Plains and the Utica and Marcellus formations in the East and Midwest, the ability to ship oil coming down to major refining locations in the Midwest and the Gulf Coast from the newer places is hindered by the lack of pipeline capacity. As a result, much of this oil must be shipped by rail which is more expensive than shipping through a pipeline. To compete, the oil coming south from North Dakota must sell at a discount. With new pipelines, however, it is becoming easier to ship oil out to the Midwest. As a result, the gap between the WTI spot price and the Brent spot price is narrowing.

The second reason is that, as mentioned earlier, refiners are not willing to pay a premium for lighter oil because their facilities are largely configured to process heavy oil and cannot process lighter grades as efficiently. To compete, the lighter oil that is being produced in places like North Dakota must be priced competitively with less expensive, heavier crude oil.

THE EFFECTS OF CRUDE OIL EXPORTS ON THE PRICE OF CRUDE OIL

Critics of oil exports argue that exports would raise the domestic price of oil and therefore the cost of petroleum products like gasoline and diesel fuel. In reality, the prices of crude oil are determined in the world oil market, not by how much oil is exported from the United States. There is a touch of irony in the argument that allowing oil exports would raise the price of oil because some complain that the significant increase in U.S. oil production in recent years has not reduced the price of oil and gasoline. But in fact, increased U.S. oil production has affected the world price of oil. The 3.5 million b/d increase in production since January 2008 has offset the loss of oil production due to unplanned disruptions in countries like Libya, Nigeria, and Angola and the sanctions imposed on Iran (Figure 3).



Had U.S. production not increased—had it continued its long-term downward trend—the world price of oil would be much higher today. Many likewise believe that gasoline prices will rise if the ban is lifted. On the surface, this seems to make sense: if we export oil, we have less of it here and therefore the price of all petroleum products must rise. Given the public’s sensitivity to changes in the price of gasoline, many in Congress are reluctant to support eliminating the ban on crude oil exports.⁹

The oil market, however, is worldwide and prices of various grades of oil are set in world markets. Producing more oil domestically will put additional downward pressure on the world price of oil. If we export oil and then have to import more of it to offset exports, it might seem a wash and the price of oil would not change. In reality, however, the price of gasoline would

likely fall a bit. The reason is that the price of light oil is artificially depressed in the United States. By allowing light oil to be exported, the price received by producers would rise, thereby spurring additional development and thus leading to an increase in production over and above what would be forthcoming were exports banned. Moreover, we note that the United States is already a net exporter of refined products such as gasoline and diesel (an average of 3.6 million b/d to date in 2014) and this has not caused domestic prices to deviate from global crude prices. That is, gasoline and diesel prices continue to move in tandem closely with the world price of crude oil despite the increase in product exports.

Arguing that the market for crude oil is not free also resonates with many, but the fact is that the price of oil is determined by the forces of global supply and demand and moves over time in a way consistent with these market forces. As mentioned above, the daily spot price of oil is impacted by a number of factors, thereby resulting in price volatility on a day-to-day basis around the longer-term trend in the price of oil. This simply reflects the rational response by market participants to events that impact the oil market. If a hurricane, for

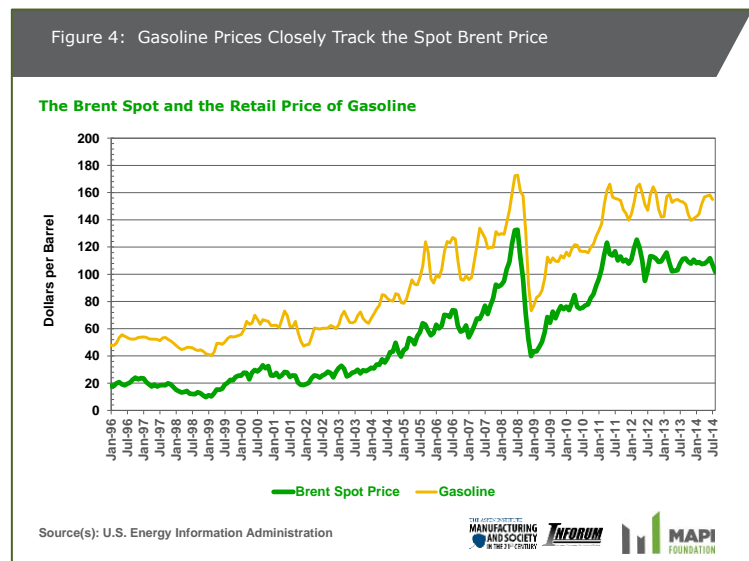
⁹ For additional analysis of the impact on gasoline prices, see Stephen P.A. Brown, et al., “Crude Behavior: How Lifting the Export Ban Reduces Gasoline Prices in the United States,” Resources for the Future, Issue Brief 14-03-REV, March 2014.

example, knocks out refineries and drilling rigs along the Gulf Coast as two did in 2005, the price of petroleum products will rise, thereby signaling consumers that, temporarily, petroleum products in some markets have become scarcer. The function of higher prices is to allocate existing supplies among consumers.

OPEC can impact the price of oil, but its ability to determine the price of oil in the long-term is limited. OPEC countries rely on the revenue generated from oil sales. If OPEC countries cut back on production, their spare production capacity will grow. The fall in revenue is very detrimental to the budgets of these countries, especially when they realize that the marginal cost of producing oil when they have spare production capacity is low.¹⁰ Eventually, growing excess capacity causes any cartel discipline to fall apart, just as it did in the mid-1980s. Added to OPEC’s problem in trying to control the price of oil are the rise in production from non-OPEC countries (including, now, the phenomenal increase in U.S. oil production) and the slowing growth in consumption in Europe and the United States.

Oil is obviously important for consumers, but so too is corn and wheat. If the U.S. imposed a ban on exports of corn and wheat, the prices of corn and wheat would fall temporarily simply because the available supply would exceed demand. Further, we are not dependent on imports of corn and wheat as is the case for oil. If we maintain a ban on oil exports, we would import less, but continue to consume the same amount of oil. Therefore, there would be no excess supply of oil in the aggregate. But if the goal is to reduce the price of essential commodities, then why not impose a ban on corn and wheat exports? One reason is that lower prices would reduce the amount of corn and wheat produced by farmers. In little time, supply would fall until the price of corn rose sufficiently to bring supply and demand into balance.

In short, as shown in the Figure 4, the price of gasoline in the United States moves almost in lockstep with the price of crude oil which is set in world markets. Regression analysis further indicates just how closely gasoline prices are linked to the world price of oil. Because petroleum products like gasoline are more closely linked to the world price of oil, the price of imported and domestically refined gasoline is expected to fall slightly. As a consequence of a slightly lower price for petroleum products and having to pay more for domestic production of light oil, refiners could see their margins reduced slightly even though they would pay less for imports of heavier oils.



METHODOLOGY

Baseline

The following analysis used the Inforum’s Long-Term Interindustry Forecasting Tool (or LIFT) to illustrate the macroeconomic and industry effects of removing the crude oil export ban. It is a dynamic equilibrium model which combines an interindustry input-output formulation with extensive use of regression analysis to create a “bottom-up” approach to macroeconomic modeling. Various versions of the LIFT model have been used over the past 45 years to describe how changes in the economic conditions or economic policy affect the economy.

We calibrated LIFT for a base economic projection which generally follows EIA’s *Annual Energy Outlook* (AEO) 2014 reference case, especially in terms of crude petroleum demand, production, imports, and prices. An overview of key variables behind this projection is shown in Table 1. Growth is very similar to the AEO from 2015 through 2017. The economy begins to recover strongly in this baseline, with growth approaching 3 percent from 2015 through 2017. Therefore, much of the excess capacity and cyclical unemployment still lingering in the economy is eliminated. In other words, we do not assume secular stagnation.

¹⁰ See, for example, “Overhead,” *The Wall Street Journal*, September 25, 2014, which discusses the impact of the recent slide in prices on various OPEC members.

Table 1: Baseline Projection
(Annual Percentage Change)

	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
REAL GDP by FINAL DEMAND CATEGORY (Annual Percentage change)										
Real Gross Domestic Product	3.3	2.8	2.8	2.7	2.6	2.5	2.5	2.5	2.4	2.5
Manufacturing Gross Output	3.4	2.3	2.5	2.4	2.1	2.5	2.6	2.6	2.4	2.4
Personal Consump. Expenditures	2.7	2.8	2.6	2.5	2.4	2.4	2.3	2.3	2.3	2.3
Nonresidential Structures	11.3	6.8	5.7	5.4	5.1	2.4	2.5	2.7	2.6	2.8
Equipment Investment	7.6	4.2	3.5	3.4	3.2	3.1	3.3	3.4	3.2	3.3
Exports	5.3	5.5	5.4	5.2	5.0	5.0	5.0	5.0	5.0	4.9
Manufactured Exports	5.9	6.1	6.0	5.6	5.4	5.3	5.4	5.4	5.3	5.2
Imports	4.1	4.5	3.9	3.8	3.7	3.3	3.2	3.1	3.3	3.3
Manufactured Imports	5.3	5.2	4.4	4.2	4.2	3.6	3.5	3.4	3.6	3.6
PRICE INDICATORS (Annual percentage change)										
GDP Deflator	1.9	2.0	2.1	2.3	2.5	2.4	2.1	2.0	2.0	1.9
POPULATION, LABOR FORCE, WAGES and PRODUCTIVITY (Annual Percentage Change)										
Population	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7
Civilian Labor Force	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.8	0.8	0.8
Total Employment	0.9	0.6	0.6	0.7	0.8	0.6	0.7	0.8	0.8	0.9
Manufacturing Employment	-0.2	-0.5	-0.6	-0.3	-0.2	-0.1	0.1	0.2	0.1	0.1
Unemployment Rate (%)	5.6	5.7	5.7	5.6	5.5	5.5	5.4	5.5	5.5	5.4
Average wage (\$/hr)	4.2	3.6	3.8	4.0	4.0	3.9	3.7	3.5	3.4	3.3
Average real wage (05\$/hr)	1.9	1.4	1.6	1.6	1.5	1.5	1.4	1.3	1.4	1.4
Total Lab Productivity (05\$/hr)	2.0	1.9	2.0	1.9	1.6	1.7	1.6	1.6	1.5	1.4
PERSONAL INCOME										
Personal Income, bil\$	5.7	5.3	5.7	5.4	5.5	5.2	4.9	4.6	4.5	4.4
Real Disp Income, bil 05\$	3.0	2.9	3.2	2.6	2.4	2.3	2.4	2.2	2.1	2.2

Source: Inforum LIFT Model

Over 2018-2023 we are a bit higher on GDP growth (by 0.3–0.4 percent per year) compared to the AEO. In our baseline, total crude oil demand and supply are higher relative to the AEO not only because of faster growth, but also because the oil intensity of the economy falls more slowly than in the AEO projections.

We think that this is a reasonable view of the economy for 2016-2025. It represents only a partial return to normality in capital and labor markets, however. In the baseline, interest and inflation rates are still very low and the demand multipliers on capital investment are still quite large, in the range of 1.7 to 2.0.

Oil Export Scenarios

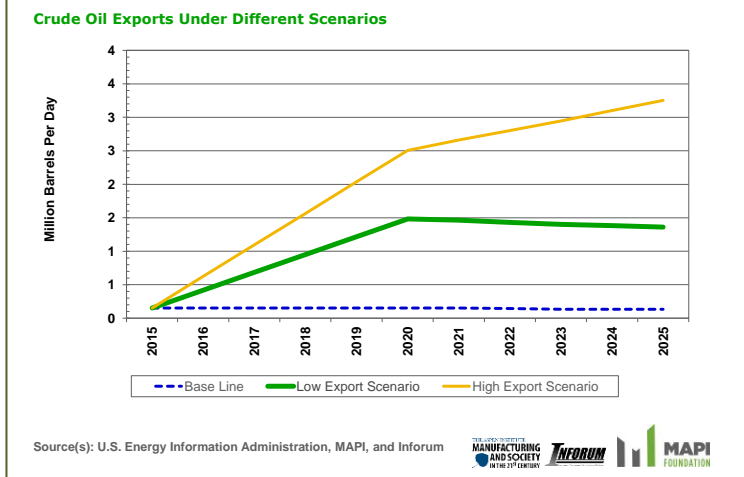
We developed two scenarios to compare to the baseline projection: (1) a low export case; and (2) a high export case. Each of the scenarios assumes a different level of exogenous crude oil exports, production, imports, oil industry capital expenditures, and oil prices. These assumptions are displayed in Table 2. We borrowed heavily from the IHS study for guidance on how removing the ban would affect crude oil export and production potentials, domestic and world oil prices, and capital expenditures for the oil and gas industries.

The baseline includes only trivial exports of crude oil of 0.13-0.15 million b/d throughout the projection horizon.¹¹ In the low oil exports alternative case, crude oil exports increase by 1.3 million b/d by 2020 compared to the baseline. This increment levels out to about 1.2 million b/d by 2025. For the high exports scenario, crude exports increase by 2.35 million b/d by 2020, rising to 3.12 million b/d by 2025. The projections on crude oil exports are shown in Figure 5.

The impact of oil exports on oil production under our two scenarios also is shown in Table 2 and Figure 6. The AEO projection of oil production shows production rising to 9.8 million b/d in 2019 and peaking at 9.96 million b/d in 2024-2025. In our low export scenario, production reaches 10.96 million b/d in 2019 and 12.13

¹¹ The AEO baseline for crude exports is almost certainly understated because it was made prior to the policy change announced earlier this year to allow exports of lease condensate. The actual exports experience this year range from 220,000 to 401,000 (July) barrel p/d, compared to 150,000 barrels p/d in the baseline. We consider the increase as part of the overall policy change suggested, that is, to remove the general ban on exports.

Figure 5: Crude Export Scenarios



important development in our scenarios, we use the capital expenditure figures very similar to the IHS study, which are shown in Table 2. According to IHS, lifting the ban will encourage immediate and large increases in capital spending in the crude oil industry. The largest increment in spending occurs in the first three years, peaking in 2017 at \$61.8 billion in the low exports scenario and \$78.8 billion in the high exports scenario. By 2025, the total increment to capital spending, relative to the baseline, is \$43.7 billion and \$62.1 billion, in each scenario, respectively. These are relatively large numbers, reaching between 0.3 and 0.4 percent in GDP in 2017 and continuing at 0.15 to 0.21 percent of GDP in 2025.

This exogenous boost to investment is divided among exploration, production, pipelines, and refining. Moreover, according to the IHS study, investment in the refining sector is actually a bit lower in the alternative scenarios since fewer refineries will require retrofitting.

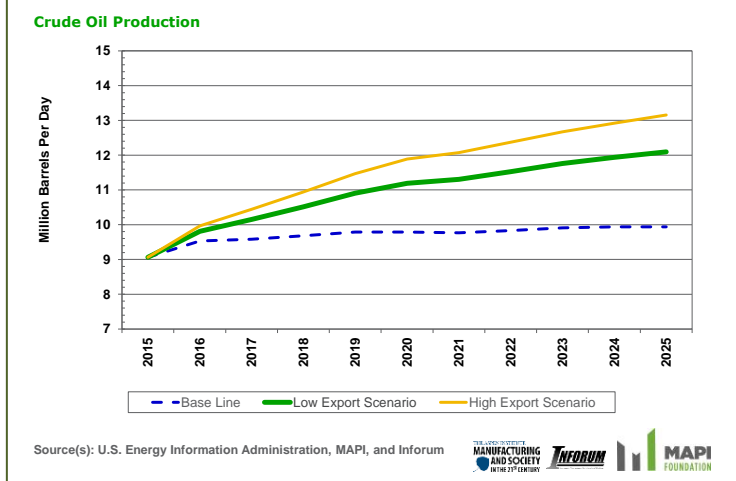
Also shown in Table 2 are projections of oil prices and the price of gasoline. The oil price paths are based on the IHS study which shows the prospective margin between domestic WTI and imports in the low and high export scenarios. The price of gasoline is based on the imported price of crude oil, a benchmark for the world price of oil. In both scenarios, the price of gasoline is lower than the price of gasoline in the baseline scenario.

million b/d in 2025. In the high export scenario, oil production rises to 11.53 million b/d in 2019 and 13.21 million b/d in 2025—an increase of 3.25 million b/d above the base case level of production.

It is worth noting that the EIA has steadily increased its long-term oil production forecast in recent years. There are two reasons for these revisions: (1) technological improvements are enabling producers to produce more from existing shale formations;¹² and (2) estimates of shale resources are being revised upward. In our low and high export scenarios, production will rise even more because eliminating the ban on exports allows producers of light oil to sell their oil at the world price rather than a discounted price.

To increase crude oil production, the industry will have to make substantial investments in exploration, production, and the transportation of crude oil. To include this

Figure 6: Allowing Crude Exports Would Raise U.S. Oil Production From Current EIA Baseline Projections



¹² Mark J. Perry, “Shale revolution deniers face an inconvenient truth,” *Investor’s Business Daily*, September 23, 2014. In the Marcellus shale for instance, gas wells are producing 700 percent more per well when compared to 2009. In the Bakker oil field production per well is up 400 percent since 2007. See also, Robert Kleinberg, “Technology on the Horizon & Over the Horizon,” Presentation made at the 2014 EIA Energy Conference in the session on Tight Oil Production Trends.

Table 2: Basic Assumptions on Petroleum Sector

First line is Baseline level as indicated.
 Second line is Low Exports, differences from the baseline as indicated.
 Second line is High Exports case, differences from the baseline as indicated.

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Crude Petroleum (Million barrels per day)											
Domestic production	9.06	9.56	9.59	9.69	9.80	9.80	9.79	9.85	9.93	9.96	9.96
Low Oil Exports (diff in MBD)	0.00	0.26	0.60	0.87	1.15	1.43	1.56	1.71	1.86	2.02	2.17
High Oil Exports (dif in MBD)	0.00	0.43	0.89	1.30	1.72	2.14	2.34	2.57	2.80	3.02	3.25
Exports	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.14	0.13	0.13	0.13
Low Oil Exports (diff in MBD)	0.00	0.27	0.53	0.80	1.06	1.33	1.31	1.29	1.27	1.25	1.23
High Oil Exports (dif in MBD)	0.00	0.47	0.94	1.41	1.88	2.35	2.51	2.66	2.81	2.97	3.12
Oil Industry Investment											
Capital Expenditures (mil\$)	231.6	234.7	239.4	244.1	249.2	255.2	261.0	266.1	271.0	276.0	281.1
Low Exports (diff in mil\$)		59.6	61.8	50.4	38.1	39.4	45.6	45.1	44.6	44.2	43.7
(% of baseline GDP)		0.32	0.31	0.24	0.17	0.17	0.19	0.18	0.17	0.16	0.15
High Exports (diff in mil\$)		73.1	78.8	63.7	47.5	50.5	65.6	64.7	63.9	63.0	62.1
(% of baseline GDP)		0.39	0.40	0.30	0.21	0.22	0.27	0.25	0.24	0.22	0.21
Oil Prices (Current Dollars per Barrel)											
Domestic Crude Price (WTI)	88.6	69.9	75.9	83.5	92.9	101.0	108.6	113.9	119.3	124.7	129.9
Low Oil Exports (\$/bbl)		24.9	20.1	16.2	11.0	7.9	5.8	5.9	6.0	6.1	6.3
High Oil Exports (\$/bbl)		23.9	19.0	15.1	9.9	6.8	4.6	4.7	4.8	4.9	5.0
Imported Crude Price (RAC)	97.9	96.1	96.3	98.9	103.1	108.0	113.4	118.8	124.3	129.8	135.0
Low Oil Exports (\$/bbl)		-2.1	-2.1	-2.1	-2.2	-2.2	-2.3	-2.3	-2.4	-2.4	-2.5
High Oil Exports (\$/bbl)		-3.1	-3.1	-3.2	-3.3	-3.3	-3.5	-3.5	-3.6	-3.7	-3.7
Regular MV Fuel (\$ per gallon)	3.5	3.5	3.6	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3
Low Oil Exports (\$/gal)		-0.03	-0.06	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08
High Oil Exports (\$/gal)		-0.05	-0.08	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09

Source: Inforum LIFT Model

MACROECONOMIC IMPACTS FROM REMOVING THE BAN ON CRUDE OIL EXPORTS

A number of studies have found that lifting the ban on crude oil exports would have a positive impact on GDP growth, employment and income.¹³ Our results reinforce the findings in these previous studies. Lifting the ban on crude oil exports has significant positive and durable effects on GDP, aggregate employment and income. Compared to the baseline, most of the initial boost to economic activity comes about through the assumed required increases in capital spending for exploration, production and pipelines. The boost to real GDP reaches a peak of 0.68 percent, or about \$105 billion, in 2017 in the low export case (Table 3 below). Though the positive boost is smaller after 2017, GDP is still 0.44 percent higher (\$70 billion) than in the baseline case by

¹³ See Trevor Houser and Shashank Mohan, *Fueling Up: The Economic Implications of America's Oil and Gas Boom*, Peterson Institute for International Economics, 2014; *America's New Energy Future: The Unconventional Oil and Gas Revolution and the US Economy, Volume 1: A Manufacturing Renaissance—Main Report*, An IHS Global Report, September 2013; *America's New Energy Future: The Unconventional Oil and Gas Revolution and the US Economy, Volume 3: A Manufacturing Renaissance—Main Report*, An IHS Global Report, September 2013; Susan Lund et al., *Game Changers: Five Opportunities for US Growth and Renewal*, McKinsey Global Institute, July 2013; *Oil and Natural Gas Transportation & Storage Infrastructure: Status, Trends, & Economic Benefits*, Report for the American Petroleum Institute submitted by IHS Global Inc. December 2013; *Shale Gas, Competitiveness, and New US Chemical Industry Investment: An Analysis Based on Announced Projects*, American Chemistry Council, May 2013; *Shale Gas: A Renaissance in US Manufacturing?* PwC, December 2011; *Energy Policy at a Crossroads: An Assessment of the Impacts of Increased Access versus Higher Taxes on U.S. Oil and Natural Gas Production, Government Revenue, and Employment*, Slide Presentation, Wood Mackenzie; Stephen P.A. Brown, et al., *Crude Behavior: How Lifting the Export Ban Reduces Gasoline Prices in the United States, op.cit.*; and *The Impacts of U.S. Crude Oil Exports on Domestic Crude Production, GDP, Employment, Trade, and Consumer Costs*. ICF International, May 2014.

2025. In the high export scenario, the increment to GDP growth peaks at 0.93 percent in 2019-2021 (or \$165 billion in 2021) and then subsides to 0.74 percent (\$141 billion) in 2025.

The reason the increase in GDP growth attributable to the removal of crude oil export ban tapers off after 2017 is that the stimulus from incremental capital expenditures falls after 2017. Nevertheless, increases in crude oil production and exports throughout the period provide a continuing boost to GDP growth. Additions to employment are also significant, reaching a peak of 495,000 in 2017 in the low exports scenario and a peak of 630,000 in 2019 in the high exports scenario. As was the case with GDP, the boost to employment falls through time as the capital expenditure boom subsides and various other industries react to higher wages by investing in increased productivity.

The increase in employment has a positive effect on real wages and thus personal income. In 2020, the average real wage in the high export scenario is 1.19 percent higher than in the base case. The positive impact continues so that by 2025, real wages in the high export scenario are 1.48 percent higher. Even in the low export scenario, real wages are raised by 0.94 percent by 2025. As shown in Table 3, wage gains on a percentage basis are higher than projected GDP gains. Real disposable personal income per household peaks at a 2.5 percent increase in 2019 and remains well above 2 percent for the forecast period after 2017.

Table 3: Crude Oil Export Simulations

For each variable:

Line #1 is in levels as indicated.

Line #2 is deviation in LOW OIL EXPORT case in percent or as indicated.

Line #3 is deviation in HIGH OIL EXPORT case in percent or as indicated.

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
REAL GDP by FINAL DEMAND CATEGORY (Billions of chained 2005 dollars)											
Real Gross Domestic Product (bil 05\$)	14600	15086	15514	15961	16405	16832	17260	17704	18158	18607	19071
Low Exports (% difference)	0.00	0.30	0.68	0.64	0.61	0.59	0.57	0.53	0.50	0.48	0.44
High Exports (% difference)	0.00	0.40	0.83	0.86	0.93	0.93	0.93	0.88	0.80	0.77	0.74
Real GDP growth	3.2	3.3	2.8	2.9	2.8	2.6	2.5	2.6	2.6	2.5	2.5
Low Exports (% growth)	3.2	3.6	3.2	2.8	2.8	2.6	2.5	2.5	2.5	2.5	2.5
High Exports (% growth)	3.2	3.8	3.3	2.9	2.9	2.6	2.5	2.5	2.5	2.4	2.5
Total Employment (millions of jobs)	153.92	155.25	156.23	157.24	158.31	159.54	160.54	161.68	162.93	164.23	165.64
Low Exports (% difference)	0	0.29	0.77	0.75	0.65	0.57	0.51	0.44	0.38	0.32	0.25
High Exports (% difference)	0	0.38	0.91	0.97	1.00	0.94	0.89	0.81	0.66	0.58	0.50
Low Exports (millions)	0.000	0.189	0.495	0.475	0.413	0.357	0.317	0.275	0.230	0.197	0.154
High Exports (millions)	0.000	0.247	0.584	0.615	0.630	0.589	0.557	0.501	0.406	0.353	0.300
Manufacturing employment	12366	12339	12282	12214	12182	12162	12145	12159	12180	12196	12205
Low Exports (thousands)	0	62.2	103.4	67.7	32.7	13.3	3.8	-6.5	-16.9	-25.6	-35.1
High Exports (thousands)	0	79.8	129.7	96.3	64.0	40.8	31.6	14.7	-8.8	-25.9	-40.9
Average real wage (05\$/hr)	30.6	31.2	31.6	32.2	32.7	33.2	33.7	34.2	34.6	35.1	35.6
Low Exports (% difference)	0	-0.05	0.49	0.77	0.87	0.86	0.88	0.89	0.91	0.93	0.94
High Exports (% difference)	0	0.05	0.67	0.99	1.16	1.19	1.26	1.32	1.37	1.43	1.48
Real Disposable Income (bil 05\$)	11039	11381	11711	12093	12415	12712	13002	13323	13615	13904	14216
Low Exports (% difference)	0	0.6	1.7	2.0	2.0	1.8	1.7	1.5	1.4	1.4	1.3
High Exports (% difference)	0	0.7	1.9	2.4	2.6	2.6	2.5	2.4	2.2	2.2	2.2
Real Disposable Income per Household (thousands of 05\$)	87.70	89.72	91.62	93.89	95.66	97.21	98.68	100.37	101.81	103.22	104.78
Low Exports (thousands of 05\$)	0	0.51	1.53	1.88	1.92	1.76	1.63	1.53	1.42	1.46	1.40
High Exports (thousands of 05\$)	0	0.61	1.75	2.27	2.53	2.49	2.46	2.39	2.25	2.32	2.27

Source: Inforum LIFT Model

Wage gains are significant in our export enhanced scenarios because most of the new jobs are in relatively high paying sectors. Median wages in the mining sector (including oil and gas extraction) are almost \$44 per hour, compared to all private sector jobs which pay \$21.78 per hour. Manufacturing jobs pay a median hourly wage of \$23, although jobs specifically in the petroleum products sector are higher at almost \$30 per hour. Construction jobs are also boosted by the growth in oil exports, and median wages are nearly \$24 per hour. It is worth noting too that manufacturing workers benefit from greater levels of health care and pension coverage than those in non-manufacturing occupations. Total compensation in all manufacturing jobs is 9 percent higher than in the non-manufacturing sector, and even higher in the oil and gas production, development, and equipment industries.

General prices and wages rise slightly compared to the baseline scenario. By 2020, the GDP deflator is 1.34 percent and 1.61 percent higher than the baseline in the low exports and high exports scenarios respectively. By 2025, these increments reach 1.76 and 2.47 percent.

The biggest gainers from lifting the ban on crude oil exports are American households. Table 3 also shows that in the low exports scenario household incomes would rise by an average between \$1,000 and \$2,000 per household (in 2005 prices). In the high exports case, the enhancements to household income are raised by \$2,000–\$3,000 per household.

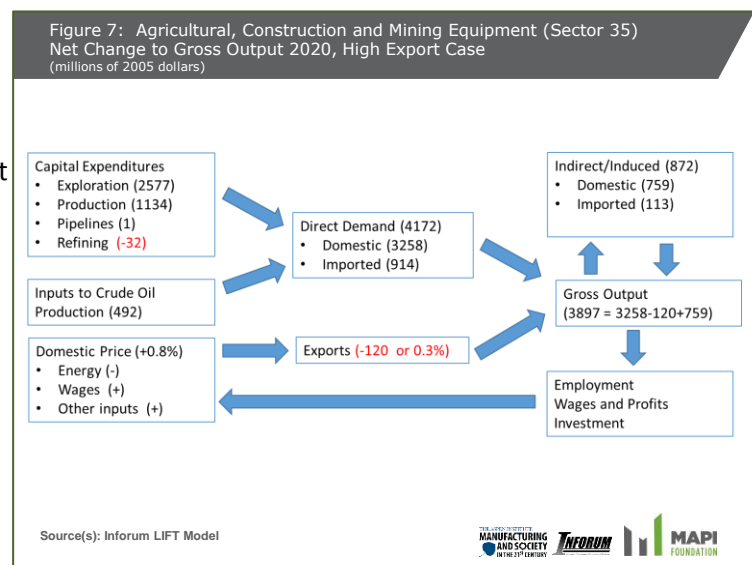
ECONOMIC IMPACT ON THE MANUFACTURING SECTOR

Ending the ban on crude oil exports would benefit the manufacturing sector in several ways. First, oil producers will increase expenditures for exploration, production, and transportation of crude oil. These activities involve long and complex supply chains which include manufactured products such as drilling pipes, pumps, drilling rigs, earth moving equipment, and motor vehicles. Purchases from manufacturers will be direct, as when a driller buys pipe or pumps and compressors. Much indirect activity also will be stimulated, such as the production of coal, ore, and limestone used to produce the steel that makes up the pipe. Second, because increased production of oil would contribute to a moderation in the world price of oil, manufacturers, especially those that consume a lot of energy, would benefit from lower prices for petroleum products. In addition, associated natural gas, which is akin to a by-product of much of the oil production from shale formations, would put additional downward pressure on the price of natural gas, an important feedstock for many manufacturers. In 2012 (the last year for which comprehensive data is available) almost 17 percent of all gas production, around 5 trillion cubic feet, came from oil wells and this number has likely increased in the last several years as most drilling is now directed at oil.

Third, the general improvement in economic growth and employment will provide manufacturers new “induced” demand for products seemingly far from the oil field supply chain. For instance, securely employed steel and oil workers earning higher salaries will be better able to afford a long-delayed new vehicle purchase. In addition to automakers, food producers, apparel providers, and appliance manufacturers would all enjoy enhanced business.

An example of how the impact on manufacturing flows through the economy is illustrated in Figure 7. The diagram shows the difference in demand and supply for the high export case compared to the baseline case for agriculture, construction, and mining equipment (ACME which is NAICS 3331) for a single year, in this case 2020. All the figures are in millions of 2005 dollars.

In total, the domestic output of the ACME sector is \$3,897 million greater in this scenario relative to the baseline projection assuming a continued oil export ban, a figure derived from several different processes acting within the LIFT model. First, compared to the baseline, direct demand from new capital expenditures increases by \$2,577 million for exploration, \$1,134 million for production, and \$12 million for pipelines. Demand for equipment from the



refining sector falls by \$32 million. Also, new exploration and higher production of crude boost intermediate demand for spare parts and other non-capital expenditures by \$492. In total, the new direct demand of \$4,172 million is split between domestic production (\$3,258 million) and imports (\$914 million). Thus, 78 percent of new demand is met by domestic manufacturers, who have a competitive advantage in this sector.

There is more to the story. As explained above, higher economic activity and employment push up general wages and input costs for industries, thus raising production prices. In the ACME case, prices are boosted compared to the baseline by 0.8 percent in 2020. These higher prices lead to a decrease in equipment exports of \$120 million, or 0.3 percent, in 2020. Finally, expansion across the economy leads to increased demand for products from the ACME sector both indirectly through oil supply chains and through induced growth in other sectors of the economy. The increment of indirect and induced demand totals \$872 million, split between \$759 million of domestic production and \$113 million in imports. The net increase in production (\$3,897 million) is therefore defined by the domestic production for new direct demand (\$3,258 million), minus the loss of exports (\$120 million), plus the domestic production for new indirect and induced demand (\$759 million).

Figure 8 provides a similar figure for the Machinery sector as a whole (NAICS 333) which includes ACME and several other industrial and service machinery sectors. The demand and supply patterns are similar, but the proportional loss of business from lower refining investment and exports is a bit larger.

Table 4 shows the output results across mining, construction and the major manufacturing sectors. Consistent with the assumptions discussed in Table 2 (page 9), petroleum extraction increases steadily throughout the period. Mining services and construction benefit from large direct new spends on exploration and development which peak in 2017 and 2018.

An end to the ban on oil exports clearly benefits most of the manufacturing subsectors, though the impact varies according to the extent to which they are connected with oil development and production activities. Industries that supply durable materials such as steel and concrete, construction and mining equipment (ACME), and transport machinery such as ships and boats all experience healthy increases in output relative to the baseline. For example, in the high export scenario, in 2017 the total output of the entire machinery sector is 3.1 percent higher (or \$12.4 million) than in the export ban baseline. This figure still registers 0.5 percent by 2025. For the ACME industry we examined above, the 2017 peak increase in output is 6 percent. The impact declines thereafter, but remains 2.8 percent above the base line projection in 2025.

On the other hand, electronics and electrical products and miscellaneous manufacturing see small net production decreases compared to the export ban baseline. In these cases, export losses and lower demand for their products from the non-oil economy outweighs any demand expansion from a more buoyant oil sector.

Table 5 shows the effects on industrial employment. As expected, mining and construction employment are substantially higher for the 2016–2025 period. Mining employment is up 294.7 thousand job years (one single job for a single year) in the case of low exports and up by 426.1 thousand in the case of high exports. Significantly, compared to the baseline, new construction employment peaks in 2017 at 181 thousand job years in the low export case and almost 216 thousand job years in the high export case. Other big gainers include the big services sector, such as finance and retail trade, parts of which are linked to the industrial sector. There, the number of job years is up between 939.2 thousand and 1.48 million job years for the low and high export scenarios, respectively. Given relatively low labor productivity in these sectors, any increments to overall demand normally means large absolute gains for employment. Durable manufacturing jobs growth peaks at 114.7 million job years in 2017, and declines after that as new production and associated equipment level off. Total accumulated gains for durables through 2025 total 371.6 thousand job years. The transportation sector also sees accumulative gain of 313.7 thousand job years over the projection period.

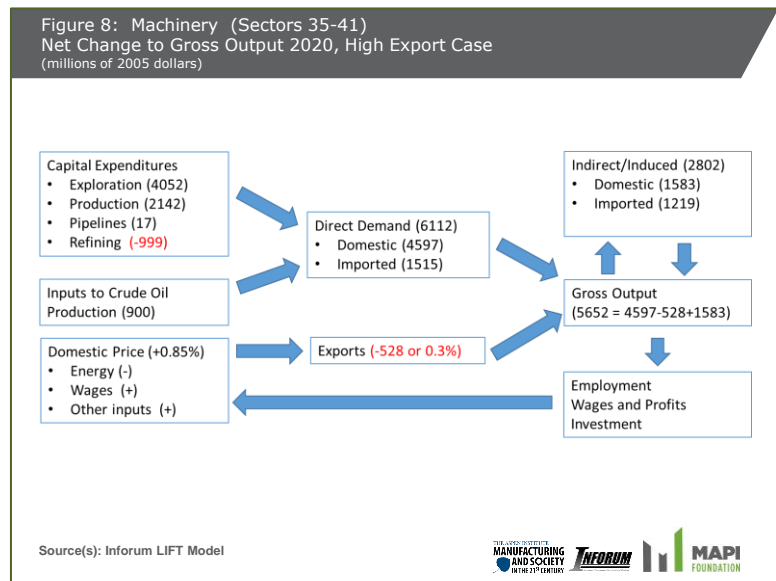


Table 4: Output by Producing Sector (Billions of 2005\$)
Deviations displayed a percent difference from the baseline

	2016	2017	2018	2020	2022	2025
Crude oil extraction (bil of 2005\$)	167.6	168.1	169.9	171.8	172.7	174.5
Low Export	2.8	6.3	9.0	14.6	17.4	21.8
High Export	4.5	9.3	13.4	21.8	26.1	32.6
Mining support activities	171.8	181.6	191.7	211.0	222.6	239.4
Low Export	2.3	4.5	3.6	2.4	1.9	1.3
High Export	3.1	5.4	4.5	3.6	3.2	1.7
Construction	1074.8	1121.1	1168.9	1260.3	1321.7	1409.5
Low Export	0.7	2.2	1.8	1.2	0.9	0.4
High Export	0.9	2.6	2.3	1.9	1.5	0.5
Manufacturing						
Nondurable Consumer Products	796.4	810.9	827.3	855.3	886.6	930.0
Low Export	0.0	0.2	0.1	0.0	-0.1	-0.2
High Export	0.0	0.2	0.2	0.1	0.0	-0.2
Nondurable Materials and Products	1678.6	1713.3	1752.0	1824.0	1913.3	2053.1
Low Export	0.2	0.4	0.2	0.1	0.2	0.2
High Export	0.3	0.6	0.4	0.3	0.4	0.5
Durable Materials and Products	569.5	580.8	596.4	624.5	659.7	712.5
Low Export	1.0	1.1	0.4	0.0	-0.2	-0.4
High Export	1.3	1.4	0.7	0.3	0.0	-0.6
Machinery	365.3	374.9	386.8	406.4	431.1	471.4
Low Export	2.5	2.6	1.8	0.9	0.7	0.3
High Export	3.1	3.3	2.4	1.4	1.2	0.5
Electronic, electrical products	578.5	599.2	623.1	666.4	718.0	805.0
Low Export	0.6	0.3	-0.3	-1.0	-1.1	-1.3
High Export	0.7	0.5	-0.2	-1.0	-1.3	-1.8
Transport Machinery	787.1	804.3	822.1	855.9	897.7	956.1
Low Export	0.8	1.2	0.8	0.5	0.4	0.2
High Export	1.0	1.5	1.1	0.9	0.7	0.3
Furniture, Health, Other Mfg	237.6	243.5	250.1	261.0	273.6	293.0
Low Export	0.2	0.4	0.0	-0.4	-0.6	-0.9
High Export	0.2	0.4	0.1	-0.3	-0.6	-1.1
Services						
Professional, business services	3603.8	1313.8	3860.2	4113.1	4374.8	4787.4
Low Export	0.4	0.7	0.6	0.5	0.4	0.3
High Export	0.5	0.9	0.9	0.8	0.7	0.5

Source: Inforum LIFT Model

Table 5: Impact on Employment-Selected Sectors of the Economy
(Thousands of Job Years)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Mining	909.7	939.6	943.8	946.1	949.7	951.2	946.6	944.3	942.3	940.4	940.6
Low Exports-difference		15.8	31.9	31.0	30.7	31.1	31.0	30.8	30.4	31.1	30.9
High Exports-difference		21.7	41.0	41.5	44.3	46.5	48.0	47.9	44.8	45.3	45.2
Construction	8175.8	8539.0	8738.0	8893.4	9051.1	9188.8	9246.3	9306.5	9365.7	9428.2	9506.0
Low Exports-difference		52.1	180.9	165.5	144.0	115.3	96.7	80.2	62.7	56.8	41.0
High Exports-difference		73.4	215.8	204.3	203.7	179.8	164.5	142.9	88.8	72.2	50.1
Durable manufacturing	7760.4	7730.1	7655.7	7570.5	7519.0	7473.2	7440.4	7429.8	7425.5	7418.3	7408.1
Low Exports-difference		57.6	91.3	61.1	30.3	14.4	7.6	-0.2	-7.9	-13.9	-20.7
High Exports-difference		73.4	114.7	84.5	54.7	36.0	30.1	17.1	-1.0	-13.5	-24.4
Transportation	5076.0	5123.3	5146.0	5156.3	5165.5	5184.2	5208.5	5241.3	5278.9	5322.6	5369.3
Low Exports-difference		13.7	33.1	29.8	25.7	22.5	20.4	17.9	15.3	13.2	10.6
High Exports-difference		18.0	39.3	39.8	40.1	36.6	35.0	31.8	27.1	24.4	21.6
Professional, business services	21,398	21,658	21,870	22,050	22,254	22,491	22,663	22,855	23,064	23,269	23,486
Low Exports-difference		66.1	139.1	130.2	112.7	101.3	94.8	86.8	77.4	70.1	60.8
High Exports-difference		87.4	172.1	177.3	177.2	169.2	167.6	156.6	136.9	124.8	114.0

Source: Inforum LIFT Model

WINNERS AND LOSERS

Any policy decision (even a decision to do nothing) creates winners and losers. A decision to maintain the ban on crude oil exports provides benefits to some while imposing costs on others. Our analysis shows that a decision to eliminate the ban provides significant benefits for the overall economy in terms of greater economic growth, higher employment, and greater personal income, as well as to the overall manufacturing sector which would benefit from a higher level of output and employment. Further, ending the ban would not raise the price of petroleum products like gasoline but would actually put some, if modest, downward pressure on these prices. This latter result of course benefits consumers but would cut into the gross margins of refineries in the United States. Total refinery output, however, would grow in our export enhanced scenarios. Growing exports of crude oil and products would lower the U.S. trade deficit by about 1 percent but would lead to strengthening the dollar and slightly lower total manufacturing exports by the end of our projection period.

CONCLUDING COMMENTS

There is an excellent case on policy grounds to end the long-standing prohibition on exports of U.S. crude oil. The economic case for such an action is even more compelling. We have provided data and analysis to support this by focusing on the manufacturing sector. This sector has led the, tepid, U.S. economic recovery since 2009 and an end to the ban on oil exports could strengthen this recovery in a material sense. Manufacturing is a source of good jobs, which is increasingly important, especially to the category of what used to be called blue collar workers whose status and income levels have been eroded in the past few decades. Increasing oil (and associated gas production) will create good paying jobs and add thousands of dollars to average household incomes. U.S. manufacturing is leading the world in the development and construction of the infrastructure equipment important to the boom in energy production. Manufacturing is still the source of much of the research and development behind innovation in the modern economy. Lifting the ban on oil exports, which arguably could be done by executive action,¹⁴ is a simple and effective way to support high economic growth, better jobs for a beleaguered segment of the working population and for skilled workers and engineers, and energy self-sufficiency for the United States and its allies.

¹⁴ Alan M. Dunn, "U.S. Export Restraints on Crude Oil Violate International Agreements And Are Vulnerable To Challenge," Stewart and Stewart, June 25, 2015.



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