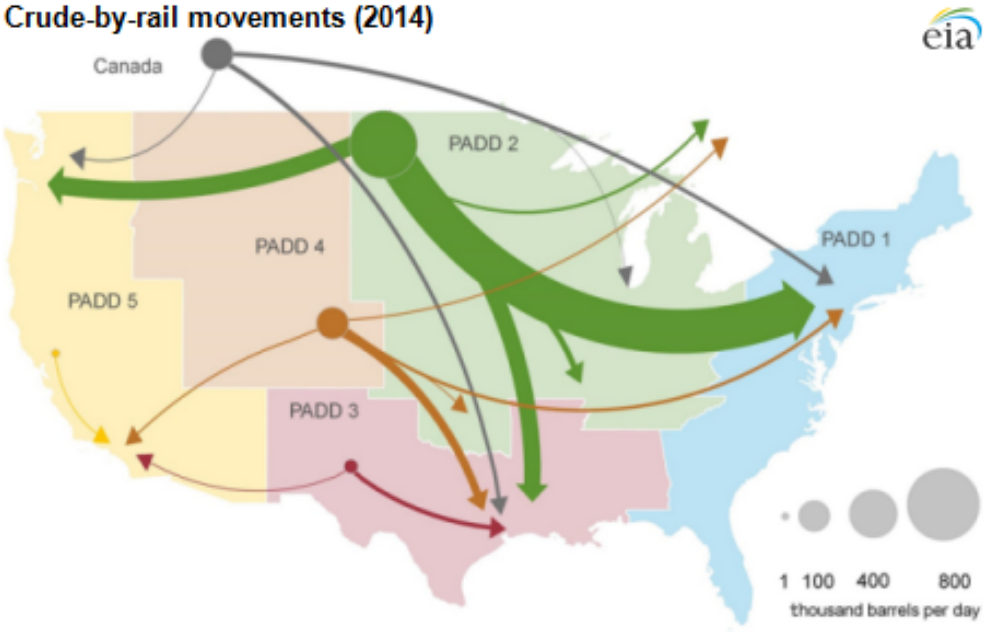
Are Railroad Bottlenecks a Second Front in the Battle of Food vs. Fuel?
James Bushnell, Jonathan Hughes, Aaron Smith[1]

Shipments of crude oil by rail have grown dramatically since 2010. Although shipments of oil still comprised less than 2% of overall rail traffic as of 2014, oil's share of freight traffic in the upper great plains has grown much larger. The confluence of growing demand for oil shipments and increasing crop yields in these regions has raised the specter of agricultural commodities stranded behind transportation bottlenecks, unable to reach markets.[2]



North Dakota shippers in particular, have questioned the impact of oil transportation on grain markets and farm incomes. A study by North Dakota State University, requested by Senator Heidi Heitkamp, estimates that delays in agricultural shipments cost famers $66 million in lost revenue in early 2014, which equates to about 4% of revenue.[3] Agribusiness companies such as Cargill and General Mills reported negative financial impacts due to disruptions in logistics and transportation. [4]

This anecdotal evidence and the attention it has attracted raise several questions to examine in detail.

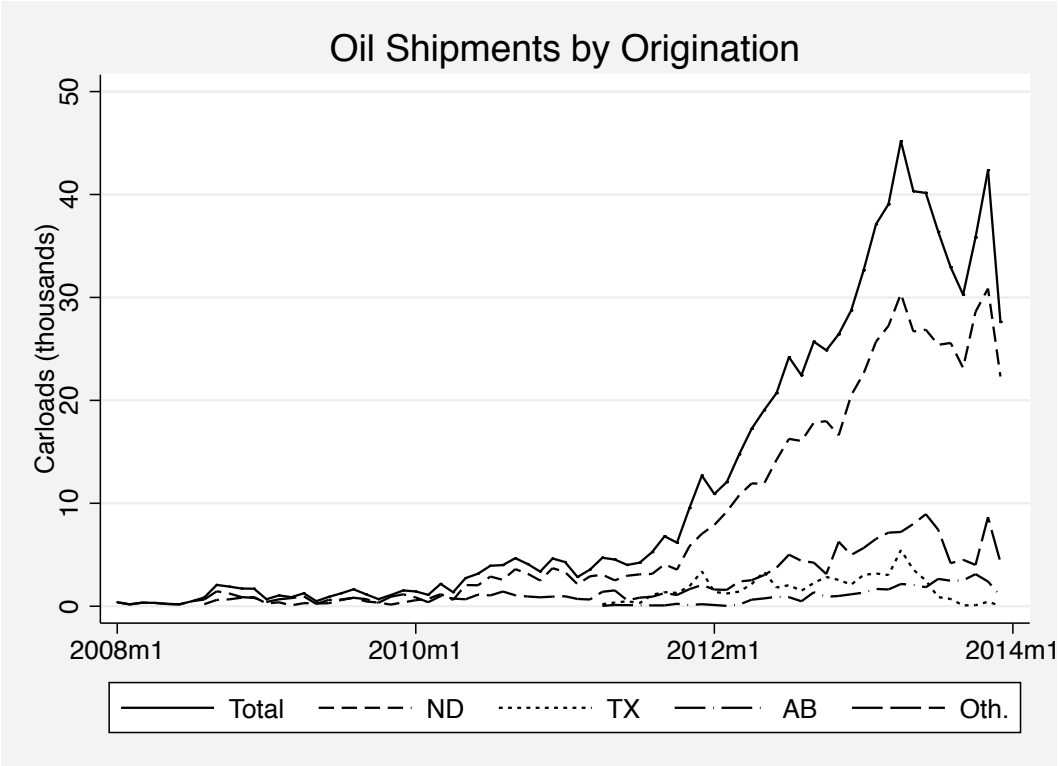
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[1] Bushnell: Dept. of Economics, UC Davis, and NBER; Hughes: Dept. of Economics, University of Colorado at Boulder; Smith: Dept. of Agricultural and Resource Economics, UC Davis.
[2] Nixon, Ron. "Grains pile up, waiting for a ride, as trains move North Dakota Oil." *The New York Times.* August 25, 2014.
[3] Olsn, F. "*Effects of 2013/14 Rail Transportation Problems on North Dakota Farm Income.* North Dakota State University. http://www.heitkamp.senate.gov/public/_cache/files/0f76d4f2-c117-4537-8fc0-8a9d3894c480/effects-of-rail-transportation-problems.pdf
[4] Doering, C. "Farmers, ag businesses brace for rail delays." *Des Moines Register.* September 13, 2014.

1. To what extent can regional agricultural commodity price changes be attributed to changes in transportation costs/availability in regions experiencing high levels of oil shipments?
2. How do these impacts, if any, compare to those attributable to shifts in the demand for rail transportation of other energy commodities, such as ethanol or coal?
3. If energy commodity transportation does have a noticeable impact on agricultural commodity values, could there be (or have there been) detectable adjustments by farmers or storage firms to these changes?
4. Are there any welfare implications of these shifts or do they reflect efficient market adjustments to supply or demand shocks?

Proposed Research Design

While the exact approach adopted for the project will depend upon both data availability and the results of initial exploration of the data, our general approach will be to utilize the variation in the intensity of oil shipments over different routes, origins, destinations, and over time. Data on shipments, by origin, destination, and routes, are available from the Surface Transportation Board's (STB) Public Waybill data. Since 2013, the growth in oil shipments has been pronounced for a subset of origins in the upper plains area.



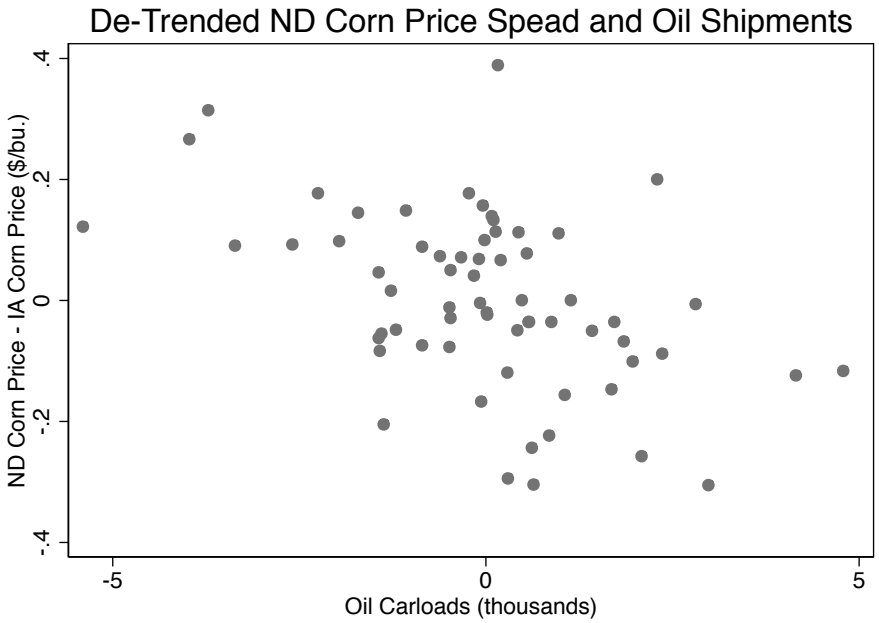
In regions where oil production has grown the most, oil shipments have increased to dominate the share of products being shipped. In addition to waybill data, the STB has recently expanded weekly reporting of 10 performance statistics, including average train speed and terminal dwell times, and cars not moved in greater than 48 and 120 hours.[5] These data capture more precisely the possible impacts of increased traffic (due to oil or otherwise) on transportation performance. These statistics can in turn be used to evaluate the relationship between shipping performance and commodity values at origins and destinations.

To discern agricultural commodity impacts, we propose utilizing crop cash market data from GeoGrains for wheat, soybeans and corn. These crops make up about 80% of row crops grown in North Dakota and similar proportions in neighboring states. These data come with a high level of geographic and temporal resolution, allowing us to see high frequency local price impacts. We plan to examine both longer term (e.g. monthly or seasonal) price impacts that may be tied to the intensity of energy commodity rail traffic, and any potential short-term price impacts that might result from accidents or disruptions.[6] Geograins data also include forward prices, which we plan to use to assess the effects of rail bottlenecks on the marginal cost of storage.

In addition to GeoGrains data, the USDA provides month-by-state level data on the prices paid to farmers for various crops. These data indicate that crop values in the upper plains, particularly North Dakota, may indeed have been affected by rail transport issues. The figure below illustrates the relationship between the North Dakota – Iowa spread in corn prices and the amount of oil shipped from North Dakota origins between 2008 and 2013. These data have been de-trended for year and month mean-effects. This reveals an apparent negative relationship (confirmed by regression analysis) between the ND-IA corn price differential and the intensity of North Dakota oil shipments.

[5] http://www.stb.dot.gov/stb/railserviceissues/rail_service_update.html

[6] GeoGrains data are priced non-linearly with respect to the number of locations and days of data are required. We would be requesting at least partial support for data purchases.



A more detailed study will have to examine the prospect that coincidental trends, such as positive yield shocks, do not account for this relationship. Over the course of the study we will have the opportunity to examine one or two more seasons of crop data as well as the impact of the recent oil price decline as additional potential sources of variation.

We can also test for a possible farmer supply response in terms of planted acres of various impacted crops and the response of storage markets as grain shipments are delayed. The USDA publishes county-level data on planted crop acres and agricultural commodity storage both on and off farm. To obtain more spatial resolution, we may use the USDA Cropland Data Layer, a dataset generated from satellite images that indicates which crop was grown each year on each 30x30 meter pixel of land.