

"Super-Port to the World?"  
An Impact Assessment of the Midwest Inland Port

by

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Submitted to the Department of Urban Studies and Planning  
in partial fulfillment of the requirements for the degree of

Master in City Planning

at the

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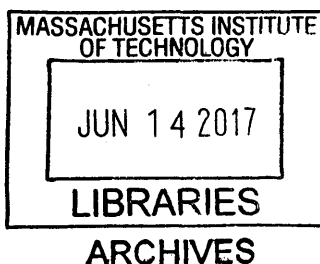
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## **ABSTRACT**

In Macon County, Illinois, one of the most recent and high profile economic development strategies involves the creation of the Midwest Inland Port (MIP), an inland port and intermodal facility. A privately owned public initiative, MIP is an infrastructure-strategy package. Part of the infrastructure includes an intermodal ramp, which is privately owned by ADM, a multinational agricultural processor. The intermodal ramp was funded, in part, by a grant from the state of Illinois. However, neither the grant application nor agreement required an impact assessment of the facility. I argue that a unique confluence of place-based factors facilitated the creation of the MIP and that a preliminary impact assessment should have been included as part of the grant application and agreement, especially in light of the high expectations for the facility. I propose a potential impact assessment methodology that considers transportation and economic impacts at the state, region, and county scales. I apply this methodology to MIP as an illustrative example. Though it is realistically too soon to determine the measurable impact of MIP, I show a means of measuring the potential impact on rail shipments and on local residents. This research enumerates a methodology that examines multi-scale impacts of transportation projects; it explains how a confluence of factors aligned to create a hybrid economic development-infrastructure model; and finally, it raises the possibility of utilizing large transportation infrastructure projects as a means of understanding industrial relations in Illinois.

**Thesis Supervisor:** Dr. Amy Glasmeier, Professor

**Thesis Reader:** Sarah Williams, Assistant Professor

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Thank you to my reader, Sarah Williams, who welcomed me into her thesis group and provided valuable feedback on how to frame my methodology.

Thank you to the people of Decatur, ADM, the Midwest Inland Port, and the state of Illinois who generously offered their time, thoughts, and feedback (and especially your willingness to explain the on-the-ground context of Decatur and compare it to other places). Thank you to the numerous others – at MIT and beyond – who allowed me to pick their brains on the subject. You have provided me with valuable insights that have greatly improved this report.

Thanks to the MIT Office of Sustainability for planting the seed of “impact across scales.” Thanks to my research advisor, Chris Zegras, for sparking my interest in evaluation methods.

The title of this thesis is a play on E.J. Kahn’s *Supermarketer to the World*, about Dwayne Andreas, which itself is a play on ADM’s “Supermarket to the World” slogan.<sup>1</sup>

Mom and Dad and Rob, thank you for your patience and encouragement. Dad, thank you for lending your advice and counsel on the Decatur side, which basically formed the foundation of the “facilitating factors” for Decatur.

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Finally, a special thank-you to the Emerson Travel Fund, which helped fund my visit to Decatur in January.

*Any mistakes hereafter are my own.*

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<sup>1</sup> Kahn, E.J. 1991. *Supermarketer to the World: The Story of Dwayne Andreas CEO of Archer Daniels Midland*. Time Warner Paperbacks, p. 3.

<sup>2</sup> “U.S. City Motto & Moniker List.” 2016. Tagline Guru.

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# 1 Introduction

Welcome to "The Pride of the Prairie"<sup>2</sup>

## 1.1 The Midwest Inland Port

In theory, an economy can be jumpstarted by just a short stretch of railroad tracks.

### 1.1.1 Overview

The Midwest Inland Port (MIP) is a privately owned public initiative in Decatur, Illinois. It is a two-part package that consists of infrastructure and economic development strategy.<sup>3</sup> The infrastructure component consists of the Archer Daniels Midland (ADM) intermodal ramp, interstate highways, and airport.<sup>3</sup> The intermodal ramp includes a staging area that transfers freight containers with a self-standing mobile crane from rail-to-truck, truck-to-rail, and rail-to-rail, as well. The Decatur and Macon County Economic Development Corporation (EDC) spearhead the "strategic economic development effort,"<sup>3</sup> which consists of advertisement and branding. ADM supports these efforts financially – in 2014, ADM gave \$125,000 to support MIP-related planning initiatives.<sup>4</sup> It also supports the EDC and Decatur separate from MIP.<sup>5</sup>

MIP has impressive network connectivity. It provides access to several un-tolled interstates; an intermodal ramp to transition containers from rail to truck, or vice versa; three Class 1 railroads<sup>6</sup> (Norfolk Southern, Canadian National, and CSX); and a cargo airport nearby that features a foreign trade zone.<sup>7</sup> MIP operates independently and outside the purview of a railroad company, which makes it uncommon and allows several railroads to be accessed from the same site.<sup>3</sup>

The construction of the intermodal ramp was funded, in part, by a \$750,000 grant from the Illinois Department of Commerce and Economic Opportunity (DCEO). Over-budget, the project that included the ramp cost \$6.15 million, of which ADM paid the difference. As shown in Figure 1—1, construction finished in 2013, and the branding as the Midwest Inland Port took place shortly thereafter. Figure 1—2 shows a time-lapse of the ramp's construction – ADM purchased the land in approximately 2010 and later began constructing the rail connection and ramp.

The expectations for this facility are high. In theory, it will not only benefit the corporate interests of its owner, but it will also unlock the potential for central Illinois to capitalize on its impressive rail infrastructure. As ADM describes in the grant application, the expected outcomes of this infrastructure investment include "improved regional access to international markets, reduced road congestion, and a reduction of carbon emissions."<sup>8</sup> Specifically, ADM expected to cut "empty container drayage" to nearby metropolitan areas, decrease "in town container drayage by 33%," and increase efficiency

<sup>2</sup> "U.S. City Motto & Moniker List." 2016. Tag!ne Guru.

<sup>3</sup> Email, Larry Altenbaumer, Strategic Advisor for MIP, 7 October 2016.

<sup>4</sup> Lusvardi, Chris. 2014. "ADM Donates \$2 Million to Affirm Commitment to Decatur." *Herald & Review*, April 25.

<sup>5</sup> Lusvardi, Chris. 2013. "ADM to Relocate Global Headquarters; Decatur Firmly in Future Plans." *Herald & Review*, September 23.

<sup>6</sup> US railroads are classified by revenue. The highest-earning railroads make up the "Class 1's." As of 2011, the operating revenues threshold was set at \$433.2 million. There are seven Class 1 railroads: BNSF, CSX, Grand Trunk (GT), Kansas City Southern (KCS), Norfolk Southern (NS), Soo Line, and Union Pacific (UP). See: Association of American Railroads. 2013. "Class I Railroad Statistics." AAR - Policy and Economics Department. <https://www.aar.org/StatisticsAndPublications/Documents/AAR-Stats-2013-01-10.pdf>, p. 1; and Federal Railroad Administration. 2017. "Freight Rail Today | Federal Railroad Administration." Accessed May 6. <https://www.fra.dot.gov/Page/PO362>.

<sup>7</sup> "Multi-Modal Capabilities." *Midwest Inland Port*. Accessed November 6, 2016. <http://www.midwestinlandport.com/multi-modal-capabilities/>.

<sup>8</sup> ADM Grant Application to Illinois DCEO, Grant #13-202002, p. iii.

between the ramp and the soybean processing plant (i.e., 50% increase in the number of connected train cars).<sup>9</sup> Their listed performance measure was the “handl[ing]” of least 6,000 intermodal containers.<sup>10</sup>

Local companies have already cut their transportation-related expenditures as a result of MIP. T/CCI, a manufacturer of air conditioner and refrigerator appliance parts, stands to gain from increased container capacity and proximity to the intermodal ramp. In total, it expects to reduce its transportation costs by \$400,000.<sup>11</sup>

ADM’s grant application explains the benefits of the intermodal ramp quantitatively. Though this facility has obvious benefits to ADM, its benefits to the broader community are less clear. Before the construction of its ramp, ADM had utilized Norfolk Southern’s intermodal facility.<sup>12</sup> It stands to reason that no formal impact assessment was conducted for the intermodal ramp because it was simply considered a transfer of existing conditions, especially as the only products that had previously been sent through the Norfolk Southern facility were ADM’s.<sup>12</sup> However, with the expectations for the facility as high as they are, the facility’s impact on the community is uncertain.

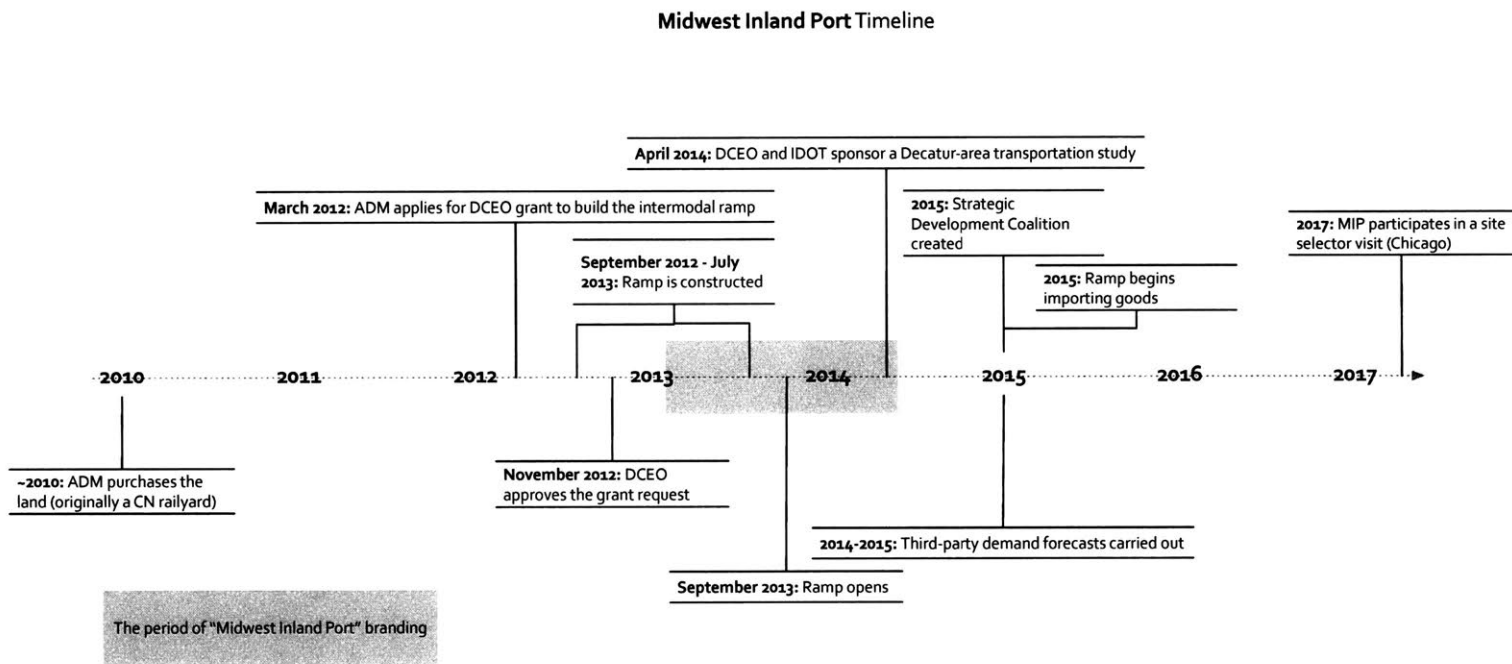
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<sup>9</sup> ADM Grant Application to Illinois DCEO, Grant #13-202002, p. ii-iii.

<sup>10</sup> ADM Grant Application to Illinois DCEO, Grant #13-202002, p. 10.

<sup>11</sup> Lusvardi, Chris. 2016. “Decatur Looking to Build on Midwest Inland Port Potential | Local | Herald-Review.com.” *Herald & Review*. [http://herald-review.com/business/local/decatur-looking-to-build-on-midwest-inland-port-potential/article\\_76fafde3-b9f3-53c9-af74-efc0e442e127.html](http://herald-review.com/business/local/decatur-looking-to-build-on-midwest-inland-port-potential/article_76fafde3-b9f3-53c9-af74-efc0e442e127.html).

<sup>12</sup> Email, Jennifer Bennett, Manager, Strategic Initiatives at ADM, 24 April 2017.



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Illinois Department of Commerce and Economic Opportunity News. 2014. "State Agencies Announce Backing for Transportation Studies in Decatur Region," April 1. [http://www.idot.illinois.gov/Assets/uploads/files/About-IDOT/News/Press-Releases/04\\_01\\_2014.pdf](http://www.idot.illinois.gov/Assets/uploads/files/About-IDOT/News/Press-Releases/04_01_2014.pdf).

Lusvardi, Chris. 2016. "Railroad on Board to Support Midwest Inland Port." *Herald & Review*. May 3. [http://herald-review.com/business/local/railroad-on-board-to-support-midwest-inland-port/article\\_7942a89f-65b8-571a-ado1-f4edaae7540b.html](http://herald-review.com/business/local/railroad-on-board-to-support-midwest-inland-port/article_7942a89f-65b8-571a-ado1-f4edaae7540b.html).

Phone Conversation, Jennifer Bennett, Manager, Strategic Initiatives at ADM, 1 December 2016.

Phone Conversation, Larry Altenbaumer, Strategic Advisor for the Midwest Inland Port, 7 October 2016.

Figure 1—1: Timeline of MIP's development.



Figure 1—2: Time-lapse aerial imagery of the construction of the ADM intermodal ramp, from 2009 to 2015. Image Sources: Google Earth Historic Satellite Imagery.



## 1.2 MIP as a Case Study

I examine MIP as a case study to understand the extent of the economic development prospects of transportation infrastructure. For much of the 20th century, Decatur was an industrial hub. To some extent, this is still true today. But despite its assets and the assets of the surrounding area, Decatur's economy has struggled. Though it is realistically too soon to see measurable impacts, I conduct a transportation and economic impact assessment to understand the potential impact of MIP at the state, region, and county levels.

### 1.2.1 Why MIP?

Originally, this thesis intended to conduct a network simulation to show the efficiency gains and congestion reduction in nearby hubs, like Chicago, as a result of a new intermodal facility. Many hypothesize that MIP has the ability to reduce, to some degree, freight-related congestion in Chicago.<sup>33</sup> The effect of the facility on Chicago is especially interesting, given Chicago's prominent role in the country's freight movements. However, this goal shifted due to feasibility concerns and my growing awareness of the unique contextual conditions surrounding MIP.

After learning that the state of Illinois had partly funded the intermodal ramp, I submitted a Freedom of Information Act (FOIA) request to view the grant agreement between ADM and the state. I examined the grant application and agreement to understand the original expectations for the ramp, both for ADM and for the broader community. While the grant application highlighted improvements of local

<sup>33</sup> Phone Call, Jennifer Bennett, Manager, Strategic Initiatives at ADM, 1 December 2017; Email, Larry Altenbaumer, Strategic Advisor for MIP, 7 October 2017; Lusvardi, Chris. 2016. "Decatur Looking to Build on Midwest Inland Port Potential | Local | Herald-Review.com." *Herald & Review*. [http://herald-review.com/business/local/decatur-looking-to-build-on-midwest-inland-port-potential/article\\_76fafde3-b9f3-53c9-af74-efcoe442e127.html](http://herald-review.com/business/local/decatur-looking-to-build-on-midwest-inland-port-potential/article_76fafde3-b9f3-53c9-af74-efcoe442e127.html).

conditions with supporting metrics, including decreased drayage from ADM across the town, no impact assessment was required of the project. (However, in 2014, DCEO and IDOT decided to sponsor a transportation study in Macon County, partly to re-assess freight movement.<sup>14</sup>)

Consequently, I shifted my focus from the future network impact of MIP to a multi-scale transportation and economic impact assessment methodology. At least in the context of highway evaluation, methods for conducting economic impact assessments are considered financially and computationally draining.<sup>15</sup> I sought to perform an impact assessment that was easily replicable with publicly available data and addressed impacts from multiple scales.<sup>16</sup> In its final sentence of the grant application to the Illinois Department of Commerce and Economic Opportunity, ADM states that the intermodal ramp will yield “benefits for ADM, the state of Illinois, and the central Illinois region.”<sup>17</sup> Thus, ADM expects the intermodal ramp to produce local, regional, and state benefits, and expectations are high. I question – but hope to confirm – this.

### 1.2.2 Research Questions and Hypotheses

This thesis inquires about the factors that allowed this hybrid model – infrastructure and economic development – to form, as well as the state’s involvement in the infrastructure financing. First, I ask: *What confluence of factors facilitated the development of MIP?* Then, I ask: *Given that there was no apparent formal impact assessment in the grant application and agreement, what is a possible impact assessment methodology, and how can it be applied to MIP?*

I hypothesize that the factors leading to the creation of MIP revolve around its actors, the industrial heritage of Decatur, and a complementary state environment on industrial relations. I propose an impact assessment methodology using publicly available data. I argue that the impact assessment should be multi-scale (local, regional, and state) given the unique conditions of MIP: the “infrastructure” dimension has the potential for a larger-scale impact than the local “economic development” dimension, but both could act at different geographic scales. My findings, which compare conditions in 2007 and 2014, suggest that it is likely too early to determine the measurable impact of MIP – one study I consulted focused on intermodal facilities that had been operational for four or more years.<sup>18</sup> That said, the methodology is easily replicable with future data.

### 1.2.3 Research Method

This thesis draws upon both qualitative and quantitative methods to examine MIP and its impacts, and, in the process, produces a methodology for assessing the impact of an economic development-infrastructure “package” like MIP. My specific research methods consist of interviews, network analysis, and secondary data analysis. In terms of interviews, I interview individuals affiliated with MIP, Decatur, and the state of Illinois, asking general questions about the facility, its expected impacts, and the state context. In terms of network analysis, I use OpenStreetMap (OSM) data to construct a network dataset in ArcGIS to model the road network in Decatur and IDOT rail crossing data to introduce an “added cost” at at-grade rail crossings. I use publicly available, anonymous rail receipts in the Public Use Waybill Survey from the Surface Transportation Board to model rail network shipments between

<sup>14</sup> Illinois Department of Commerce and Economic Opportunity News. 2014. “State Agencies Announce Backing for Transportation Studies in Decatur Region,” April 1. <http://www.idot.illinois.gov/Assets/uploads/files/About-IDOT/News/Press-Releases/04.01.2014.pdf>.

<sup>15</sup> “New Tool for Estimating Economic Impacts of Transportation Projects: Transportation Project Impact Case Studies (T-PICS).” 2012.

<sup>16</sup> As a caveat, this thesis relies on publicly available data but utilizes tools in ArcGIS for visualization and local network analysis.

<sup>17</sup> ADM Grant Application to Illinois DCEO, Grant #13-202002, p. iii.

<sup>18</sup> In reference to intermodal facilities and their effect on jobs in: Miller, Chad, Brian Richard, Tulio Sulbaran, and Martin Lipinski. 2012. “Job Creation Factors for Inland and Near Dock Intermodal Facilities.” In *National Conference on Intermodal Transportation: Problems, Practices, and Policies*, 52–60. Hampton, VA. [http://www.memphis.edu/ifti/pdfs/research\\_job\\_creation\\_factors.pdf](http://www.memphis.edu/ifti/pdfs/research_job_creation_factors.pdf), p. 55.

Business Economic Areas (BEAs). In terms of secondary data analysis, I use Local Employment Dynamics (LED) and Quarterly Workforce Indicator (QWI) data from the US Census Bureau to model firm employee composition and earnings; County Business Patterns from the US Census Bureau to examine job shifts by county; Bureau of Labor Statistics' Characteristics of the Employed to understand which industries, nationally, are predominantly full-time; and Bureau of Economic Analysis' Economic Profile data to compare earnings of employees and per capita resident earnings.

### **1.3 Document Overview**

In this chapter, I introduce MIP, enumerate my research questions and hypotheses, and provide an overview of the methodology. In the second chapter, I provide a theoretical overview, which explains inland ports, impact assessment, and the adaptation of my impact assessment methodology. In the third chapter, I examine the facilitating factors from the perspective of the locality (Decatur and Macon County) and the state (Illinois). In the fourth chapter, I explain my methodology. In the fifth, sixth, and seventh chapters, I apply my multi-scale methodology to the state, region, and county levels to assess MIP. In the eighth chapter, I discuss my findings and their implications.



## 2 Theory

"What you want, as an inland port, is to have many different kinds of companies, with their modalities and their abilities; the inland port is only really an enabler to attract companies."—Arénso Bakker, StigConsult partner.<sup>19</sup>

### 2.1 Inland Ports

#### 2.1.1 Overview

By definition, MIP is an inland port. Inland ports are aptly named – they serve a similar function as maritime ports but are situated inland (and often, like MIP, without direct water access). In *The Identification and Classification of Inland Ports*, Leitner and Harrison (2001) define an inland port as "a site located away from traditional land, air, and coastal borders containing a set of transportation assets (normally multimodal) and with the ability to allow international trade to be processed and altered by value-added services at the site as goods move through the supply chain."<sup>20</sup> Other definitions of inland port cite their intermodal capacity<sup>21</sup> and economic development prospects.<sup>22</sup> Inland ports grew out of the idea that as sites move inland, roadways are clearer and land costs lower.<sup>23</sup> By some accounts, the trajectory of inland ports mirrors that of rail in North America, which suggests that inland ports have existed since the 1800s.<sup>24</sup>

In addition to these definitions, inland ports are expected to have other attributes. In a Jones Lang LaSalle report on the advent of the inland port, Carver *et al.* (2011) list several, including a supportive government, an established coalition or group, an availability of nearby land and workers, an approved foreign trade zone (FTZ), a Class 1 railroad to facilitate maritime port access, and, within a 200-mile range, an ability to reach three million or more people.<sup>25,26</sup> Using these attributes, there were at most twelve inland ports in the US in 2011.<sup>25</sup> MIP upholds all of these: its construction costs were paid, in part, by a grant from the state of Illinois; it has a seven-member coalition;<sup>27</sup> it has both rezoned nearby farmland<sup>28</sup> and available workers, evident from a high – but decreasing – unemployment rate in Decatur;<sup>29</sup> it has an FTZ at the Decatur Airport; it boasts immediate access to three Class 1 railroads;<sup>27</sup> and St. Louis, Chicago, and Indianapolis lie within a 250-mile radius.<sup>30</sup>

<sup>19</sup> Field, Alan. "Western Canada's Rapidly Expanding Inland Ports: Accelerating Regional Economic Growth," n.d., p. 11.

<sup>20</sup> Leitner, Sara Jean, and Robert Harrison. 2001. "The Identification and Classification of Inland Ports (0-4083-1)," p. 43.

<sup>21</sup> Smith, Michael E. n.d. "Western North Carolina Inland Port Feasibility Study." <http://savethecape.org/stcwp1/wp-content/uploads/PDFs/WNCInlandPortFeasibility.pdf>, p. 8.

<sup>22</sup> Leitner, Sara Jean, and Robert Harrison. 2001. "The Identification and Classification of Inland Ports (0-4083-1)," p. 42.

<sup>23</sup> Iannou, Petros. 2008. "Introduction to Intelligent Freight Transportation." In *Intelligent Freight Transportation*, edited by Petros A. Iannou, 16. Boca Raton: CRC Press.

<sup>24</sup> Rodrigue, Jean-Paul, and Theo Notteboom. 2017. "Inland Ports / Dry Ports." In *The Geography of Transport Systems*, 4th.

<sup>25</sup> Carver, John R., Aaron L. Ahlburn, Richard H. Thompson, and Craig S. Meyer. "Perspectives on the Global Supply Chain: The Emergence of the Inland Port," 2011, p. 2.

<sup>26</sup> A similar list appears in Schlottmann (2012) citing Allen (n.d.), who cites the Heitman Real Estate Investment Management Firm. See: Schlottmann, Alan. 2012. "Nevada Inland Ports: Viability & Funding Study." Las Vegas. [http://diversifynevada.com/uploads/studies/Final\\_Nevada\\_Inland\\_Port\\_Report.pdf](http://diversifynevada.com/uploads/studies/Final_Nevada_Inland_Port_Report.pdf), p. Part 1: III-1.

<sup>27</sup> "Multi-Modal Capabilities." *Midwest Inland Port*. Accessed November 6, 2016. <http://www.midwestinlandport.com/multi-modal-capabilities/>.

<sup>28</sup> Conversation, Larry Altenbaumer, Strategic Advisor for MIP, 9 January 2017.

<sup>29</sup> Decatur's 2016 annual average unemployment rate was 6.6%, compared to 11.2% in 2010. See: "Local Area Unemployment Statistics Map." 2017. *Bureau of Labor Statistics*. <https://data.bls.gov/map/MapToolServlet>.

<sup>30</sup> "Innovation in Industry." Decatur: EDC of Decatur and Macon County; Midwest Inland Port, 2015. <http://www.midwestinlandport.com/wp-content/uploads/2015/08/MIP-Booklet-8x8-SinglePages-10-30F.pdf>.

There are four types of inland ports, according to Leitner and Harrison (2001). These include *air cargo ports*, where air facilities cater to cargo shipments; *inland waterway ports*, where a port is high-traffic but located far from coasts; *maritime feeder inland ports*, where a maritime port's services can take place off-site; and *trade and transportation center inland ports*, which feature customs clearance, value-added capacity, and numerous shipment modes.<sup>31</sup> In the same vein, Schlottmann (2012) also provides examples of inland port types, including *logistics air parks*, *multi-modal logistics parks*, *rail intermodal parks*, *satellite marine terminals*, *trade processing centers*, and *virtual inland ports* (as an "economic development initiative").<sup>32</sup>

Kansas City is touted as a well-developed inland port.<sup>34</sup> It overcomes jurisdictional challenges to capitalize on existing freight infrastructure and NAFTA.<sup>33</sup> KC SmartPort, as it is known, developed in 2001.<sup>33</sup> As an entity, KC SmartPort serves a role similar to the EDC of Decatur and Macon County; to spur economic growth, it provides advertisement and site-selection services.<sup>34</sup> Thus, KC SmartPort utilizes existing freight infrastructure grow the local economy.

Inland port financing is often circumstance-specific. In general, both the public and private sectors facilitate transportation projects.<sup>35</sup> According to a NADO Research Foundation report on inland ports, private and public funds are often used together.<sup>36</sup> In an inland port viability study for Nevada, Schlottmann (2012) mentions public (especially federal level) and private funds as common sources, though inland ports often lack a standardized funding mechanism.<sup>37</sup> In the context of intermodal facilities, Miller *et al.* (2012) list incentives, as well as public and private actors as potential funding sources.<sup>38</sup>

### 2.1.2 Motivation and Expectations

Given these features, inland ports appear to be attractive investments. Among other benefits, inland ports are expected to boost local area employment<sup>36</sup> and provide network efficiency gains;<sup>39</sup> in discussing intermodal facilities, including those that are inland, Miller *et al.* (2012) cite freight efficiency gains, regional economy boosts, and added jobs as the primary motivators for their development.<sup>40</sup> In the context of a potential inland port in Hampton Roads, Virginia, an inland port is posed as a remedy for an over-capacity transportation network.<sup>41</sup> Even more, inland ports are expected to draw in new firms.<sup>39</sup> Thus, the purported benefits of inland ports span economic development, in terms of job

<sup>31</sup> Leitner, Sara Jean, and Robert Harrison. 2001. "The Identification and Classification of Inland Ports (0-4083-1)," p. 50.

<sup>32</sup> Schlottmann, Alan. 2012. "Nevada Inland Ports: Viability & Funding Study." Las Vegas. [http://diversifynevada.com/uploads/studies/Final\\_Nevada\\_Inland\\_Port\\_Report.pdf](http://diversifynevada.com/uploads/studies/Final_Nevada_Inland_Port_Report.pdf), p. Part 1: II-3.

<sup>33</sup> "Kansas City SmartPort: The Regionalization of Logistics." 2017. In *The Geography of Transport Systems*. [https://people.hofstra.edu/geotrans/eng/ch4en/appl4en/kc\\_smartport.html](https://people.hofstra.edu/geotrans/eng/ch4en/appl4en/kc_smartport.html).

<sup>34</sup> "About KC SmartPort." 2017.

<sup>35</sup> Bryan, Joseph G B, Glen Weisbrod, and Carl D Martland. 2007. "NCHRP Report 586: Rail Freight Solutions to Roadway Congestion—Final Report and Guidebook." Washington, DC. doi:10.17226/14098, p. 21.

<sup>36</sup> NADO Research Foundation. 2016. "Inland Ports: Linking Freight and Regional Economic Development." Accessed December 1. [https://www.nado.org/wp-content/uploads/2013/10/Inland\\_report\\_FINAL.pdf](https://www.nado.org/wp-content/uploads/2013/10/Inland_report_FINAL.pdf), p. 2.

<sup>37</sup> Schlottmann, Alan. 2012. "Nevada Inland Ports: Viability & Funding Study." Las Vegas. [http://diversifynevada.com/uploads/studies/Final\\_Nevada\\_Inland\\_Port\\_Report.pdf](http://diversifynevada.com/uploads/studies/Final_Nevada_Inland_Port_Report.pdf), p. 3.

<sup>38</sup> Miller, Chad, Brian Richard, Tulio Sulbaran, and Martin Lipinski. 2012. "Job Creation Factors for Inland and Near Dock Intermodal Facilities." In *National Conference on Intermodal Transportation: Problems, Practices, and Policies*, 52-60. Hampton, VA. [http://www.memphis.edu/ifti/pdfs/research\\_job\\_creation\\_factors.pdf](http://www.memphis.edu/ifti/pdfs/research_job_creation_factors.pdf), p. 53.

<sup>39</sup> Carver, John R., Aaron L. Ahlburn, Richard H. Thompson, and Craig S. Meyer. 2011. "Perspectives on the Global Supply Chain: The Emergence of the Inland Port," p. 1.

<sup>40</sup> Miller, Chad, Brian Richard, Tulio Sulbaran, and Martin Lipinski. 2012. "Job Creation Factors for Inland and Near Dock Intermodal Facilities." In *National Conference on Intermodal Transportation: Problems, Practices, and Policies*, 52-60. Hampton, VA. [http://www.memphis.edu/ifti/pdfs/research\\_job\\_creation\\_factors.pdf](http://www.memphis.edu/ifti/pdfs/research_job_creation_factors.pdf), p. 52.

<sup>41</sup> Nichols, Keith M., and Stephanie L. Shealey. 2011. "Traffic Impact of an Inland Port in Hampton Roads." Chesapeake. [http://www.hrtpo.org/uploads/docs/Inland\\_Port\\_Facility\\_Final\\_Report.pdf](http://www.hrtpo.org/uploads/docs/Inland_Port_Facility_Final_Report.pdf), p. 1.

generation and firm relocation, and freight network improvement, in terms of efficiency and congestion reduction. These potential benefits suggest that a host of actors stand to gain from these facilities.

### 2.1.3 Related Classifications

Inland ports also qualify as intermodal facilities. However, the reverse is not always true. Intermodal facilities do not necessarily qualify as inland ports, according to Carver *et al.* (2011).<sup>25</sup> By definition, intermodal facilities align several travel modes for the shipment of goods.<sup>40,42</sup> Possible modes include road, rail, air, and water-based transport.<sup>40, 42</sup> Inland ports are effectively "satellite intermodal facilities."<sup>43</sup> According to Miller *et al.* (2012), there are three potential operating structures for intermodal facilities: *developer facility*, in which the intermodal facility is constructed by a developer; *landlord intermodal facility*, in which the facility is rented to an operator but remains government-owned; and *operator intermodal facility*, in which ownership and operation falls to rail companies, as is usually the style in the US.<sup>44</sup>

Often, freight facilities become the foundation of a logistics cluster. Yossi Sheffi, author of *Logistics Clusters: Delivering Value and Driving Growth*, is one of the forefathers of logistics cluster research. Sheffi helped bring Zaragoza, a highly successful logistics cluster and inland port in Spain, to fruition.<sup>45</sup> Liliana Rivera, a student of Sheffi's, provides a detailed explanation of logistics clusters and agglomerations in her doctoral dissertation (2014). Rivera classifies a logistics cluster as "the geographical concentration of firms providing logistics services, such as third-party-logistics (3PL-s), transportation carriers, warehousing providers and forwarders."<sup>46</sup> While MIP may not yet qualify as a logistics cluster, the high expectations for the facility align with the tenets of a logistics cluster.

## 2.2 Impact Assessment

### 2.2.1 Overview

In theory, some type of evaluation takes place both before and after an infrastructure investment – the former to ensure that the investment is worthwhile, and the latter to evaluate how the investment has been used and whether it has been used effectively. Both types of evaluations are easier to describe than conduct. For instance, in discussing maritime ports, Rodrigue and Schulman (2017) support that ports go hand-in-hand with global markets; they acknowledge that despite the purported economic benefits of port facilities – and the public sector's desire to realize them – it is challenging to examine the economic impact of these facilities at a larger scale.<sup>47</sup> This review will focus on post-project evaluation. Post-project evaluation is an example of impact assessment.<sup>48</sup> Impact assessment

<sup>42</sup> Sulbaran, Tulio, and MD Sarder. 2013. "Logistical Impact of Intermodal Facilities." In *ASEE Southeast Section Conference*, 14. <http://se.asee.org/proceedings/ASEE2013/Papers2013/183.PDF>, p. 1.

<sup>43</sup> Sulbaran, Tulio, and MD Sarder. 2013. "Logistical Impact of Intermodal Facilities." In *ASEE Southeast Section Conference*, 14. <http://se.asee.org/proceedings/ASEE2013/Papers2013/183.PDF>, p. 2.

<sup>44</sup> Miller, Chad, Brian Richard, Tulio Sulbaran, and Martin Lipinski. "Job Creation Factors for Inland and Near Dock Intermodal Facilities." In *National Conference on Intermodal Transportation: Problems, Practices, and Policies*, 52-60. Hampton, VA, 2012. [http://www.memphis.edu/ifti/pdfs/research\\_job\\_creation\\_factors.pdf](http://www.memphis.edu/ifti/pdfs/research_job_creation_factors.pdf), p. 54.

<sup>45</sup> Sheffi, Yossi. 2012. *Logistics Clusters: Delivering Value and Driving Growth*. Cambridge, Massachusetts: The MIT Press, p. xii.

<sup>46</sup> Rivera, Liliana. 2014. "Logistics Clusters: Prevalence and Impact." MIT, p. 19.

<sup>47</sup> Rodrigue, Jean-Paul, and Joseph Schulman. "The Economic Impacts of Port Investments." In *The Geography of Transport Systems*, 439. Accessed February 16, 2017. <https://people.hofstra.edu/geotrans/eng/ch7en/appl7en/ch7a5en.html>.

<sup>48</sup> Weisbrod, Glen. 2000. "NCHRP Synthesis 290: Current Practices for Assessing Economic Development Impacts from Transportation Investments." Washington, DC. [http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_syn\\_290.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_290.pdf), p. 2.

determines a project's impacts, or effects, measured against baseline outcomes.<sup>49</sup> Post-project evaluation quantifies a project or investment's impact by using a point-in-time analysis.<sup>48</sup>

### 2.2.2 Methods

Two common evaluation methods are economic impact assessment (EIA) and cost-benefit analysis (CBA). Both EIA and CBA are often used in the evaluation of transportation projects.<sup>50</sup> CBA is a method for appraising a project's benefits with respect to its costs.<sup>51</sup> EIA is defined as a method for determining a project's economic consequences at a certain scale.<sup>52</sup> Social impact analysis and environmental impact analysis are also common streams of assessment.<sup>53</sup>

There are several main differences between EIA and CBA. In a visual schematic, Weisbrod *et al.* (2015) summarize the *element*, *space*, and *time* differences between EIA and CBA. EIA covers delineated boundaries, considers long-term consequences, and evaluates broader effect on the economy. CBA examines wide-reaching costs and benefits, discounts the costs and benefits to a single amount, and focuses on societal outcomes.<sup>54</sup> Furthermore, EIA examines impacts from three perspectives: *direct impacts*, which result from the investment directly; *indirect impacts*, which result from local expenditures, borne out of the direct impacts; and *induced impacts*, which arise from direct and indirect impacts and include local economic effects that result from increased incomes of local residents.<sup>55</sup> According to the FHWA, common platforms for conducting EIA are IMPLAN and RIMS-II.<sup>56</sup>

### 2.2.3 Economic and Transportation Impacts

I develop a form of impact assessment modeled off EIA. In *Measuring the Impacts of Freight Transportation Improvements on the Economy and Competitiveness: Tools and Techniques* (2017), FHWA cites the oft-narrow approach of EIA in considering only the economic impacts, and they describe how transport projects have the potential for large-scale effects.<sup>56</sup> Two domains of freight-related impacts are *economic* and *transportation effects*.<sup>57</sup> In the breadth of literature on freight and freight-related impacts, I identify relevant transportation and economic impact metrics in Table 2—1.

<sup>49</sup> International Association of Impact Assessment (IAIA). 2009. "What Is Impact Assessment?" IAIA. [http://www.iaia.org/uploads/pdf/What\\_is\\_IA\\_web.pdf](http://www.iaia.org/uploads/pdf/What_is_IA_web.pdf), p. 1.

<sup>50</sup> Weisbrod, Glen, Corinne Mulley, and David Hensher. "Recognising the Complementary Contributions of Cost Benefit Analysis and Economic Impact Analysis to an Understanding of the Worth of Public Transport Investment: A Case Study of Bus Rapid Transit in Sydney," 2015. doi:10.1016/j.retrec.2016.06.007, p. 3.

<sup>51</sup> Sassone, P. G., and William A. Schaffer. 1978. *Cost-Benefit Analysis: A Handbook*. New York: Academic Press, Inc, p. 12.

<sup>52</sup> Weisbrod, Glen, and Burton Weisbrod. 1997. "Measuring Economic Impact of Projects and Programs." *Transportation Research Circular #477*. Boston. <http://www.edrgroup.com/pdf/econ-impact-primer.pdf>, p. 1.

<sup>53</sup> Sassone, P. G., and William A. Schaffer. 1978. *Cost-Benefit Analysis: A Handbook*. New York: Academic Press, Inc, p. 132.

<sup>54</sup> Weisbrod, Glen, Corinne Mulley, and David Hensher. "Recognising the Complementary Contributions of Cost Benefit Analysis and Economic Impact Analysis to an Understanding of the Worth of Public Transport Investment: A Case Study of Bus Rapid Transit in Sydney," 2015. doi:10.1016/j.retrec.2016.06.007, p. 5.

<sup>55</sup> O'Rourke, Laurence, Eric Beshers, and Daniel Stock. "Measuring the Impacts of Freight Transportation Improvements on the Economy and Competitiveness," 2015. <https://ops.fhwa.dot.gov/publications/fhwahop15034/fhwahop15034.pdf>, p. 37.

<sup>56</sup> FHWA. 2017. "Measuring the Impacts of Freight Transportation Improvements on the Economy and Competitiveness: Tools and Techniques - FHWA Freight Management and Operations." *Freight Management and Operations*. <https://ops.fhwa.dot.gov/publications/fhwahop15034/ch4.htm>.

<sup>57</sup> Steele, Christopher W., and Daniel Hodge. 2011. "NCFRP Report 13: Freight Facility Location Selection : A Guide for Public Official." *National Cooperative Freight Research Program*. Washington, DC. doi:10.17226/14594, p. 11-12.

Table 2—1: A (non-exhaustive) review of potential economic and transportation impact indicators.

Report	Year	Relevant Pages	Type of Impact	Mentioned Indicators	Qualifiers?
<b>AECOM, Will County Center for Economic Development: Inland Port Impact Study Executive Summary</b> <sup>58</sup>	2010	4-5	Economic	Job Growth Wages	
[Same as above]	2010	4-5	Transportation	Congestion Freight Containers ( <i>Volume</i> )	
<b>FHWA, Measuring the Impacts of Freight Transportation Improvements on the Economy and Competitiveness: Tools and Techniques</b> <sup>56</sup>	2017	—	Economic	Aggregate Personal Income Business Output Total Employment Value Added	
[Same as above]	2017	—	Transportation	Congestion Delays Commodities Travel Time Reduction Traffic	
<b>Freight Rail Futures for the City of Chicago</b> <sup>59</sup>	2003	3		Shipment Patterns	<i>Not part of the impact assessment but as context</i>
<b>Miller et al., Job Creation Factors for Inland and Near Dock Intermodal Facilities</b> <sup>60</sup>	2012	1	Economic	Job Creation	
<b>Steele and Hodge, NCFRP Report 13</b> <sup>61</sup>	2011	13-14	Economic	Income Jobs New Firms Property Values Wages	
[Same as above]	2011	14-15	Transportation	Traffic Modes	

<sup>58</sup> AECOM. "Will County Center for Economic Development: Inland Port Impact Study Executive Summary." 2010. [http://www.willcountycd.com/uploads/4/3/5/2/43522821/inland\\_port\\_study.pdf](http://www.willcountycd.com/uploads/4/3/5/2/43522821/inland_port_study.pdf).

<sup>59</sup> "Freight Rail Futures for the City of Chicago." 2003. Stamford, CT and Cambridge, MA. <http://www.edrgroup.com/pdf/ChicagoRailFreightFutures.pdf>.

<sup>60</sup> Miller, Chad, Brian Richard, Tulio Sulbaran, and Martin Lipinski. 2012. "Job Creation Factors for Inland and Near Dock Intermodal Facilities." In *National Conference on Intermodal Transportation: Problems, Practices, and Policies*, 52-60. Hampton, VA. [http://www.memphis.edu/ifti/pdfs/research\\_job\\_creation\\_factors.pdf](http://www.memphis.edu/ifti/pdfs/research_job_creation_factors.pdf).

<sup>61</sup> Steele, Christopher W., and Daniel Hodge. 2011. "NCFRP Report 13: Freight Facility Location Selection : A Guide for Public Official." *National Cooperative Freight Research Program*. Washington, DC. doi:10.17226/14594.

Report	Year	Relevant Pages	Type of Impact	Mentioned Indicators	Qualifiers?
				Pollution Safety	
<b>Weisbrod, NCHRP Synthesis 290<sup>62</sup></b>	2000	3, 28	Economic	Business Development Economic Output Jobs Land Use Personal Income Property Development Property Values Sales Tourism	
<b>Weisbrod and Weisbrod, Measuring Economic Impacts of Projects and Programs<sup>63</sup></b>	1997	1	Economic	Business Output / Sales Jobs Personal Income / Wages Value Added / Gross Regional Product Wealth / Property Values	

As Table 2—1 demonstrates, many possible metrics gauge the economic and transportation impacts of a project. The evaluation of intermodal facilities often focuses on job creation. Miller *et al.* (2012) describe how support for intermodal facilities often arises from job generation potential.<sup>40</sup> With a sample of 39 different kinds of facilities, they examine how the facility was financed alongside its management and operating structure, and they attempt to explain which elements have the biggest impact on job generation in "intermodal" types of employment.<sup>64</sup> Using hypothesis testing with regressions, their research culminates in several findings: facilities with at least some public investment tended to generate more jobs,<sup>65</sup> though major limitations must be acknowledged;<sup>66</sup> jobs are not affected by a facility's magnitude;<sup>66</sup> the biggest job gains typically happen in places that already have a transportation-oriented economic base;<sup>66</sup> and job generation is largest near facilities that have been in operation the longest.<sup>66</sup>

#### 2.2.4 Inland Port Assessment Examples

Both pre- and post-project impact assessments exist for inland ports. Pre-project inland port feasibility studies exist for Nevada,<sup>67</sup> Western North Carolina,<sup>68</sup> and Hampton Roads, Virginia.<sup>69</sup> An example of a

<sup>62</sup> Weisbrod, Glen. 2000. "NCHRP Synthesis 290: Current Practices for Assessing Economic Development Impacts from Transportation Investments." Washington, DC. [http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_syn\\_290.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_290.pdf).

<sup>63</sup> Weisbrod, Glen, and Burton Weisbrod. 1997. "Measuring Economic Impact of Projects and Programs." *Transportation Research Circular #477*. Boston. <http://www.edrgroup.com/pdf/econ-impact-primer.pdf>.

<sup>64</sup> Miller, Chad, Brian Richard, Tulio Sulbaran, and Martin Lipinski. "Job Creation Factors for Inland and Near Dock Intermodal Facilities." In *National Conference on Intermodal Transportation: Problems, Practices, and Policies*, 52-60. Hampton, VA, 2012. [http://www.memphis.edu/ifti/pdfs/research\\_job\\_creation\\_factors.pdf](http://www.memphis.edu/ifti/pdfs/research_job_creation_factors.pdf), p. 55.

<sup>65</sup> Miller, Chad, Brian Richard, Tulio Sulbaran, and Martin Lipinski. "Job Creation Factors for Inland and Near Dock Intermodal Facilities." In *National Conference on Intermodal Transportation: Problems, Practices, and Policies*, 52-60. Hampton, VA, 2012. [http://www.memphis.edu/ifti/pdfs/research\\_job\\_creation\\_factors.pdf](http://www.memphis.edu/ifti/pdfs/research_job_creation_factors.pdf), p. 57.

<sup>66</sup> Miller, Chad, Brian Richard, Tulio Sulbaran, and Martin Lipinski. "Job Creation Factors for Inland and Near Dock Intermodal Facilities." In *National Conference on Intermodal Transportation: Problems, Practices, and Policies*, 52-60. Hampton, VA, 2012. [http://www.memphis.edu/ifti/pdfs/research\\_job\\_creation\\_factors.pdf](http://www.memphis.edu/ifti/pdfs/research_job_creation_factors.pdf), p. 60.

<sup>67</sup> Schlottmann, Alan. 2012. "Nevada Inland Ports: Viability & Funding Study." Las Vegas. [http://diversifynevada.com/uploads/studies/Final\\_Nevada\\_Inland\\_Port\\_Report.pdf](http://diversifynevada.com/uploads/studies/Final_Nevada_Inland_Port_Report.pdf).

<sup>68</sup> Smith, Michael E. n.d. "Western North Carolina Inland Port Feasibility Study." <http://savethecape.org/stcwp1/wp-content/uploads/PDFs/WNCInlandPortFeasibility.pdf>.

<sup>69</sup> Nichols, Keith M., and Stephanie L. Shealey. 2011. "Traffic Impact of an Inland Port in Hampton Roads." Chesapeake. [http://www.hrtpo.org/uploads/docs/Inland Port Facility Final Report.pdf](http://www.hrtpo.org/uploads/docs/Inland%20Port%20Facility%20Final%20Report.pdf).

post-project impact assessment on an inland port is Will County (Illinois) Center for Economic Development's Inland Port Impact Study. This inland port developed in 2002 with the intermodal facilities of BNSF and UP, totaling "\$3 billion of private investment."<sup>70</sup> The project involving the ADM intermodal ramp, in comparison, cost \$6.15 million to develop (though there has been additional community-wide investment). The report evaluates the impact of the inland port, to date, by examining job growth, wages, amount of freight containers, and resulting congestion.<sup>71</sup> It provides strategies for how Will County should build off of the foundation of the inland port and address its consequential safety issues and congested networks.<sup>72</sup>

## 2.3 Theoretical Adaptation

### 2.3.1 Overview

To adapt the current practices of impact assessment to MIP, I supplement the existing literature on impact assessment with *graph theory* and *location theory* as theoretical grounding. Graph theory allows us to visualize networks, location theory allows us to understand how firms locate on these networks, and impact assessment allows us to evaluate these location-based impacts.

### 2.3.2 Graph Theory

Graph theory provides a theoretical model for network visualization. I explain several foundational definitions, list examples of metrics and indices at the node and network levels, and discuss the applications of graph theory to transportation.

#### 2.3.2.1 Overview

Graphs are a means of visualizing a network.<sup>74</sup> The basic components of a graph consists of *nodes*, or vertices, and *edges*, or links, from one node to another.<sup>73,74,75,76</sup> Graphs depict structural conditions of node relations.<sup>77</sup> Meirelles (2013) and Rodrigue and Ducruet (2017) date network and graph theory back to Leonard Euler in the 1700s.<sup>78, 75</sup> Edges convey *weight*, demonstrating the significance of the link, and *direction*, demonstrating the starting and ending points of the link.<sup>79</sup> An un-weighted edge simply means that two nodes are connected.<sup>79</sup> An un-directed edge implies a bi-directional, or "symmetric," relation.<sup>79</sup>

There are several types of graphs. A *simple* graph has only one kind of edge that connects any two nodes; a *multi-graph* has more than one kind of edge that connects any two nodes.<sup>75</sup> A *unimodal*, or *unipartite*, graph has only one kind of node; a *multi-modal*, or *multi-partite*, graph has more than one

<sup>70</sup> AECOM. "Will County Center for Economic Development: Inland Port Impact Study Executive Summary." 2010. [http://www.willcountycd.com/uploads/4/3/5/2/43522821/inland\\_port\\_study.pdf](http://www.willcountycd.com/uploads/4/3/5/2/43522821/inland_port_study.pdf), p. 3.

<sup>71</sup> AECOM. "Will County Center for Economic Development: Inland Port Impact Study Executive Summary." 2010. [http://www.willcountycd.com/uploads/4/3/5/2/43522821/inland\\_port\\_study.pdf](http://www.willcountycd.com/uploads/4/3/5/2/43522821/inland_port_study.pdf), p. 4-5.

<sup>72</sup> AECOM. "Will County Center for Economic Development: Inland Port Impact Study Executive Summary." 2010. [http://www.willcountycd.com/uploads/4/3/5/2/43522821/inland\\_port\\_study.pdf](http://www.willcountycd.com/uploads/4/3/5/2/43522821/inland_port_study.pdf), p. 5-6.

<sup>73</sup> Boffey, T.B. *Graph Theory in Operations Research*. London: The Macmillan Press Ltd., 1982, p. 1.

<sup>74</sup> Meirelles, Isabel. *Design for Information*. Beverly: Rockport, 2013, p. 49.

<sup>75</sup> Rodrigue, Jean-Paul, and Cesar Ducruet. "Graph Theory: Definition and Properties." In *The Geography of Transportation*, 411, 2017. Accessed January 3, 2017. <https://people.hofstra.edu/geotrans/eng/methods/ch1m2en.html>.

<sup>76</sup> Wilson, Robin J. *Introduction to Graph Theory*. 4th ed. Addison Wesley Longman Limited, 1996. <http://www.maths.ed.ac.uk/~aar/papers/wilsongraph.pdf>, p. 2.

<sup>77</sup> Rodrigue, Jean-Paul. "Graph Representation of a Real Network." In *The Geography of Transport Systems*, 2017. <https://people.hofstra.edu/geotrans/eng/methods/graphrepresentation.html>.

<sup>78</sup> Meirelles, Isabel. *Design for Information*. Beverly: Rockport, 2013, p. 48.

<sup>79</sup> Meirelles, Isabel. *Design for Information*. Beverly: Rockport, 2013, p. 51.

kind of node.<sup>74</sup> Portions of a graph or network are known as *sub-graphs*, in which every node and edge of the sub-graph exists in the graph.<sup>75,80</sup> A *path* is a series of edges to reach one node from another.<sup>75,81</sup>

### 2.3.2.2 Metrics and Indices

Many types of metrics exist to explain and convey information about graphs. These metrics explain features of individual nodes, as well as features of the entire graph.<sup>82</sup> Table 2—2 identifies basic node-level metrics by definition and purpose, and Table 2—3 identifies graph- or network-level metrics.

Table 2—2: Basic node-level metrics.

Metric	Definition	Purpose
<b>Order or Degree</b>	Count of the edges linked to a node <sup>76,82,83</sup>	Determines node's significance; can identify <i>hubs</i> (high degree) and <i>terminals</i> (low degree) <sup>82</sup>
<b>In-Degree</b>	For directed edges; a count of the edges terminating at a given node <sup>83</sup>	Identifies nodes as end-points (collectors) of trips <sup>82</sup>
<b>Out-Degree</b>	For directed edges; a count of the edges starting at a given node <sup>83</sup>	Identifies nodes as generators of trips <sup>82</sup>
<b>Average Nearest Neighbors Degree</b>	Average degree of a node's neighbors <sup>82</sup>	Contextualizes a node's surroundings <sup>82</sup>

Table 2—3: Basic network-level metrics.

Metric	Definition	Purpose
<b>Average Degree</b>	Average network degree; calculated by averaging all nodes' degrees <sup>84</sup>	Determines <i>local connectivity</i> <sup>84</sup>
<b>Density</b>	Length of edges divided by total land area <sup>82</sup> (or the ratio of the number of edges to the number of possible combinations of edges <sup>84</sup> )	Explains network saturation <sup>82</sup>
<b>Diameter</b>	"Shortest path" distance to reach the farthest node <sup>82</sup>	Proxies how well-connected the network is <sup>82</sup>
<b>Average Shortest Path Length</b>	Average number of traversed nodes between nodes that are far apart <sup>82</sup>	Explains the ease of long-distance travel on the network <sup>82</sup>

### 2.3.2.3 Extension to Analysis

This thesis uses graph theory to characterize the structure of freight and passenger networks. In general, there are numerous examples of transportation applications for graph theory and networks. In addition to showing basic connections, edges can (and should) also show travel.<sup>75</sup> Rodrigue and Ducruet (2017) discuss how graph theory grounds the space-based aspects of travel modes. They describe how nodes differentiate some modes (e.g., air and maritime travel) and how edges differentiate others (e.g.,

<sup>80</sup> Wilson, Robin J. *Introduction to Graph Theory*. 4th ed. Addison Wesley Longman Limited, 1996. <http://www.maths.ed.ac.uk/~aar/papers/wilsongraph.pdf>, p. 12.

<sup>81</sup> Meirelles, Isabel. *Design for Information*. Beverly: Rockport, 2013, p. 52.

<sup>82</sup> Ducruet, Cesar, and Jean-Paul Rodrigue. "Graph Theory: Measures and Indices." In *The Geography of Transport Systems*, 411, 2017. Accessed January 3, 2017. <https://people.hofstra.edu/geotrans/eng/methods/ch1m3en.html>.

<sup>83</sup> Meirelles, Isabel. *Design for Information*. Beverly: Rockport, 2013, p. 51-2.

<sup>84</sup> King, David J. "Analytical Approaches to Investigating Transit Network Resilience," 2015. [https://tspace.library.utoronto.ca/bitstream/1807/69653/3/King\\_David\\_201506\\_MAS\\_thesis.pdf](https://tspace.library.utoronto.ca/bitstream/1807/69653/3/King_David_201506_MAS_thesis.pdf), p. 28.



rail and car travel).<sup>75</sup> Using graph theory, King (2015) writes his Masters thesis on resilience in Toronto's public transit network<sup>85</sup> and develops a "relative importance" metric for metro stations.<sup>86</sup>

### 2.3.3 Location Theory

Location theory identifies the drivers of firm location selection and how firms choose to place themselves on a network. I explain location theory from the perspective of industry and then agriculture specifically, due to the fact that ADM straddles both industry and agriculture, and explain how location theory extends to transportation. Chapman and Walker (1991) argue that location theory consists of bottom-up and top-down components, in which the former describes how the industrial composition of a location develops, and the latter describes how firms decide to settle.<sup>87</sup> This review will focus on the latter.

#### 2.3.3.1 Overview

##### 2.3.3.1.1 Industry

Alfred Weber was one of the forefathers of modern industrial location theory.<sup>88</sup> In *Theory of the Location of Industries*, Alfred Weber (1962) proposes an industrial location theory model for manufacturing industries.<sup>89</sup> Under the Weber model, industrial location theory consists of *locational factors*, or economic factors that justify a firm's choice of settlement, and *locational units*, or the places where the locational factors apply.<sup>90</sup> According to Weber, locational factors can be further classified as *regional* or *agglomerative*.<sup>91</sup> Regional locational factors explain the regional geographic landscape of firms,<sup>92</sup> and they derive from transportation and available workers.<sup>93</sup> Agglomerative locational factors arise primarily from *agglomeration economies*,<sup>94</sup> or the value to a firm from colocation.<sup>95</sup> *Degglomerative* locational factors also exist, which represent geographic distribution.<sup>96</sup> Cost reduction is the foundation of the Weber model of industrial location theory.<sup>97</sup> However, Chapman and Walker (1991) describe the limitations to Weber's cost assumptions for transporting goods.<sup>98</sup>

##### 2.3.3.1.2 Agriculture

A sub-component of location theory is agricultural location theory. Agricultural location theory explains how land is allocated for farm use.<sup>99</sup> Alonso (1964) describes how agricultural land allocation dates back to von Thunen's model from the mid-19<sup>th</sup> century.<sup>100</sup> Agricultural location theory is analogous to

<sup>85</sup> King, David J. "Analytical Approaches to Investigating Transit Network Resilience," 2015. [https://tspace.library.utoronto.ca/bitstream/1807/69653/3/King\\_David\\_201506\\_MAS\\_thesis.pdf](https://tspace.library.utoronto.ca/bitstream/1807/69653/3/King_David_201506_MAS_thesis.pdf), p. ii.

<sup>86</sup> King, David J. "Analytical Approaches to Investigating Transit Network Resilience," 2015. [https://tspace.library.utoronto.ca/bitstream/1807/69653/3/King\\_David\\_201506\\_MAS\\_thesis.pdf](https://tspace.library.utoronto.ca/bitstream/1807/69653/3/King_David_201506_MAS_thesis.pdf), p. 8.

<sup>87</sup> Chapman, Keith, and David F. Walker. *Industrial Location*. Cambridge: Basil Blackwell, 1991, p. 3.

<sup>88</sup> Chapman, Keith, and David F. Walker. *Industrial Location*. Cambridge: Basil Blackwell, 1991, p. 39.

<sup>89</sup> Weber, Alfred, and Carl J. Friedrich. *Theory of the Location of Industries*. Chicago: The University of Chicago Press, 1962, p. 1 (footnote).

<sup>90</sup> Weber, Alfred, and Carl J. Friedrich. *Theory of the Location of Industries*. Chicago: The University of Chicago Press, 1962, p. 17-8.

<sup>91</sup> Weber, Alfred, and Carl J. Friedrich. *Theory of the Location of Industries*. Chicago: The University of Chicago Press, 1962, p. 35.

<sup>92</sup> Weber, Alfred, and Carl J. Friedrich. *Theory of the Location of Industries*. Chicago: The University of Chicago Press, 1962, p. 20-1.

<sup>93</sup> Weber, Alfred, and Carl J. Friedrich. *Theory of the Location of Industries*. Chicago: The University of Chicago Press, 1962, p. 124; Smith, David M. *Industrial Location: An Economic Geographical Analysis*. New York: John Wiley & Sons, Inc., 1971, p. 114.

<sup>94</sup> Weber, Alfred, and Carl J. Friedrich. *Theory of the Location of Industries*. Chicago: The University of Chicago Press, 1962, p. 21.

<sup>95</sup> Glaeser, Edward L. "Introduction." In *Agglomeration Economics*, edited by Edward L. Glaeser, 1-14. The University of Chicago Press, 2010. <http://www.nber.org/chapters/c7977>, p. 1.

<sup>96</sup> Weber, Alfred, and Carl J. Friedrich. *Theory of the Location of Industries*. Chicago: The University of Chicago Press, 1962, p. 126.

<sup>97</sup> Chapman, Keith, and David F. Walker. *Industrial Location*. Cambridge: Basil Blackwell, 1991, p. 19.

<sup>98</sup> Chapman, Keith, and David F. Walker. *Industrial Location*. Cambridge: Basil Blackwell, 1991, p. 41-2.

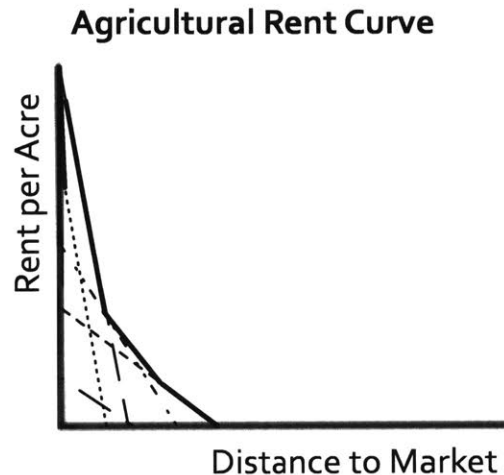
<sup>99</sup> Kellerman, A. "Agricultural Location Theory 1: Basic Models." *Environment and Planning A* 21, no. September 1988 (1989): 1381-96. doi:10.1068/a211381, p. 1381.

<sup>100</sup> Alonso, William. *Location and Land Use: Toward a General Theory of Land Rent*. Harvard University Press, 1964, p. 37.

location theory for other industries; Isard (1956) describes how land rent equates to labor or utility costs in other industries.<sup>101</sup>

Figure 2—1 illustrates the agricultural rent curve, which shows the rent premium for agricultural land close to the market. The rent gradient is steeper for certain lines, or “uses” of land.<sup>102</sup> This rent premium is offset by a reduction in transportation costs.<sup>101</sup> This bid-rent process is described in detail by William Alonso (1964).<sup>103</sup>

Figure 2—1: Agricultural rent curve.



**Recreated from:** Isard, Walter. *Location and Space-Economy*. New York: The Technology Press of Massachusetts Institute of Technology and John Wiley & Sons, Inc., 1956, p. 195.

### 2.3.3.2 Extension to Analysis

This thesis uses location theory to understand the theoretical justification for new jobs and firm relocation after investment in transportation infrastructure. Transportation is an implicit part of location theory. Dating back to Weber's model, transportation costs formed the foundation of a firm's decision to locate, or not to locate. Despite the limitations of Weber's argument,<sup>98</sup> transportation is still a major factor in firm decision-making. Chapman and Walker (1991) point to several changes over the last century that impact transportation and location decision-making. They explain that transportation costs are becoming relatively less expensive, overall, and that transportation costs for intermediate or unprocessed goods are not growing as fast as transportation costs for final goods.<sup>104</sup> Generally, transportation strongly impacts firm location decisions.

<sup>101</sup>Isard, Walter. *Location and Space-Economy*. New York: The Technology Press of Massachusetts Institute of Technology and John Wiley & Sons, Inc., 1956, p. 189-90.

<sup>102</sup> Isard, Walter. *Location and Space-Economy*. New York: The Technology Press of Massachusetts Institute of Technology and John Wiley & Sons, Inc., 1956, p. 195.

<sup>103</sup> Alonso, William. *Location and Land Use: Toward a General Theory of Land Rent*. Harvard University Press, 1964, p. 41.

<sup>104</sup> Chapman, Keith, and David F. Walker. *Industrial Location*. Cambridge: Basil Blackwell, 1991, p. 43.

#### 2.3.4 Summary of Theoretical Approach

Many streamlined methods exist for conducting impact assessments.<sup>105</sup> However, many are costly and drawn out, at least for some types of transportation projects (i.e., highways), which delays – or prevents – impact assessments from the outset.<sup>106</sup> In Weisbrod’s NCHRP Synthesis 290, the findings of a survey distributed to transportation departments suggest that there is “widespread desire for further research to better validate the link between individual transportation projects and subsequent impacts on local or regional economic development.”<sup>107</sup> Even more, the findings suggest that economic development impact assessment would benefit from uniform processes for conducting the evaluation, alongside accessible data.<sup>107</sup>

Using graph theory and location theory to supplement the current practices of impact assessment, I develop an impact assessment methodology that considers transportation and economic impacts, as discussed in Steele and Hodge (2011).<sup>57</sup> I propose a point-in-time analysis that considers a variety of transportation and economic indicators, informed by the literature and by graph and location theory. Specifically, I focus on shipment patterns, changes in employment and job creation (including absolute and from the perspective of young firms), earnings, and local congestion in light of commuting patterns. I examine these changes across three geographic scales, in line with Steele and Hodge’s (2011) finding that impacts to the public vary by geography.<sup>57</sup> Thus, my approach follows a multi-scale transportation and economic impact assessment.

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<sup>105</sup> Bryan, Joseph G B, Glen Weisbrod, and Carl D Martland. 2007. “NCHRP Report 586: Rail Freight Solutions to Roadway Congestion – Final Report and Guidebook.” Washington, DC. doi:10.17226/14098, p. 19.

<sup>106</sup> “New Tool for Estimating Economic Impacts of Transportation Projects: Transportation Project Impact Case Studies (T-PICS).” 2012, p. 1.

<sup>107</sup> Weisbrod, Glen. 2000. “NCHRP Synthesis 290: Current Practices for Assessing Economic Development Impacts from Transportation Investments.” Washington, DC. [http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_syn\\_290.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_290.pdf), p. 3.

### 3 Facilitating Factors

*"As you drive any of the four-lane highways into Decatur, vast cornfields line the road and extend to the horizon. Your nose tells you that you're nearing town, for the sickening-sweet smell of processed corn fills the air."<sup>108</sup>*

In this section, I examine the facilitating factors of MIP. I relay the context locally in Decatur and at the state level, as these two levels display the most obvious sources of support for MIP's development.

#### 3.1 Decatur and Macon County

First, I examine the local context in the city of Decatur and Macon County. From this review, it is clear that Decatur, a rural town with a struggling economy, showed tremendous public support for MIP; it has natural, institutional, and industrial assets at its disposal and a historic strength in industry and transportation; and a major corporate partner shoulders some of the infrastructural burden.

##### 3.1.1 Overview

Situated in central Illinois, Decatur is at the center of the triangle formed by three major cities: Chicago, St. Louis, and Indianapolis. In more ways than one, Decatur epitomizes the Midwestern American city. As Kurt Eichenwald describes in the opening paragraphs of *The Informant*, which chronicles former ADM employee Mark Whitacre's involvement in price fixing and ultimately embezzlement, Decatur is home to:

*"Working-class houses. An Assembly of God church. A man-made lake. The vast fields of corn that could be seen from the air were no longer visible, replaced instead by an entanglement of industrial plants and office buildings. These were the sights of a thousand other blue-collar neighborhoods in a thousand other Midwestern towns."<sup>109</sup>*

In this description, the similarity between Decatur and other Midwestern towns revolves around physical characteristics, but there are many other examples of likeness.<sup>110</sup> Figure 3—1 shows an aerial view of Decatur – plots of fertile farmland surround the industrial core of the downtown, and the airport (triangular runways) appears in the southeast.<sup>111</sup>

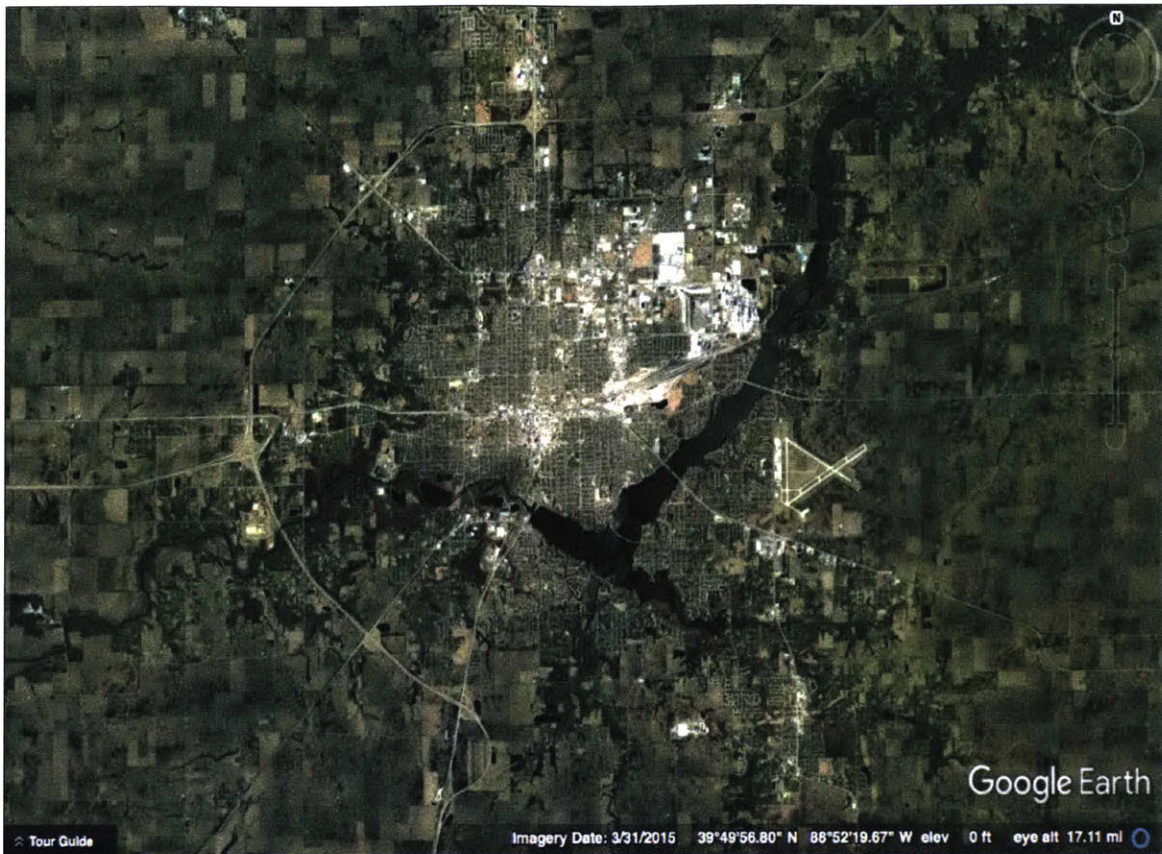
<sup>108</sup> Ashby, Steven K., and C.J. Hawking. 2009. *Staley: The Fight for a New American Labor Movement*. Urbana: University of Illinois Press, p. 7.

<sup>109</sup> Eichenwald, Kurt. *The Informant*. 2000, p. 11.

<sup>110</sup> Originally published in 11.407, Economic Development Tools and Techniques, final report written by author. Reproduced here verbatim.

<sup>111</sup> Petty, Allison. 2016. "Decatur Airport Marks 70th Anniversary." *Herald & Review*, September 30. [http://herald-review.com/news/local/govt-and-politics/decat-ur-airport-marks-th-anniversary/article\\_65fe064f-fa06-593a-ba32-0e27bee5b52.html](http://herald-review.com/news/local/govt-and-politics/decat-ur-airport-marks-th-anniversary/article_65fe064f-fa06-593a-ba32-0e27bee5b52.html).

Figure 3—1: Aerial photograph of Decatur, showing the downtown surrounded by plots of farmland. Image Source: Google Earth Pro.



### 3.1.2 Demographics

During the second half of the twentieth century, Decatur's population changed.<sup>110</sup> Its population loss – 11% of its 1970 population by 2010 – lends itself to the notion of a *shrinking city*.<sup>112</sup> Historically, Decatur's economy has had an agricultural as well as industrial focus, made possible by its rural setting. Uniting agriculture and industry, Decatur's economy has also been largely influenced by the presence of ADM. Using 1970 – the year after ADM's headquarters settled in Decatur – as a base year, one can begin to understand the enormity of the demographic change since then. Between 1970 and 2010, the total population decreased; the population became relatively older, meaning that there were fewer young people in 2010 than in 1970; the population diversified; and the work force transformed, as the share of men in the labor force decreased by nearly 15% and the share of women in the labor force increased by over 10%. Furthermore, within the Civilian labor force, the unemployment rate more than doubled for men, increasing less severely for women.<sup>113, 114</sup>

<sup>112</sup> See 9.1.1.1.1 in the Appendix.

<sup>113</sup> See 9.1.1.1.2 in the Appendix.

<sup>114</sup> Originally published in 11.407, Economic Development Tools and Techniques, final report written by author. Reproduced here mostly verbatim but with slight modifications.



This demographic shift was accompanied by eventual financial hardship. Decatur has a higher poverty rate than the country as a whole.<sup>115</sup> In 2014, 13.1% of families; 42.5% of all families with a female-headed household, with no husband; and 61.5% of families with a female headed household, with no husband, with related children under the age of 5 live in poverty in the Decatur MSA.<sup>116</sup> Further research shows that all of these percentages exceed their nation-level counterparts: for the nation, 11.5% of families, 30.9% of families with a female-headed household with no husband, and 47% of families with a female-headed household with no husband with related children under the age of 5 live in poverty.<sup>117</sup>

<sup>110</sup>

### 3.1.3 Economic Base

Decatur's economy revolves around a few key industries. Out of the 46,164 jobs reported by the US Census Bureau's County Business Patterns in Macon County in 2014, most were in *Health care and social assistance* (17%); *Manufacturing* (15%); *Retail trade* (12%); *Accommodation and food services* (10%); *Management of companies and enterprises* (8%); *Construction* (6%); and *Transportation and warehousing* (6%).

Location quotients (LQs), which are a ratio of local industry prevalence to national or state-level industry prevalence, indicate a place's industrial strengths and weaknesses relative to the nation or state.<sup>118</sup> LQs larger than 1.25 indicate an *export*, whereas LQs smaller than 0.75 indicate an *import*.<sup>118, 110</sup> I use LQs to compare Macon County and Illinois to understand the strengths and weaknesses of Macon relative to the state. Macon excels in *Utilities* (3.04), *Management of companies and enterprises* (2.16), *Construction* (1.86), *Manufacturing* (1.51), and *Transportation and warehousing* (1.34),<sup>119</sup> relative to the state. It is weaker in *Real estate and rental leasing* (0.72); *Finance and insurance* (0.57); *Wholesale trade* (0.55); *Information* (0.50); *Administrative and support and waste management and remediation services* (0.47); *Professional, scientific, and technical services* (0.33); and *Mining, quarrying, and oil and gas extraction* (0.25),<sup>120</sup> relative to the state. Thus, Macon's strengths relative to Illinois are in utilities, management, construction, manufacturing, and transportation and warehousing. Except for manufacturing, these strengths lie outside of Macon's main job sources (health care and retail).

### 3.1.4 Active Local Initiatives

In light of Decatur's struggling economy, there have been several local infrastructure improvement and economic development programs, some of which encouraged the development of an inland port. In terms of infrastructure, Decatur recently implemented a local fuel tax. The tax was implemented in April 2016, and it is levied on diesel (\$0.01/gallon) and non-diesel gasoline (\$0.05/gallon).<sup>121</sup> It will expire in 2026, and the tax capitalizes a fund dedicated to Decatur street improvements. Since its implementation, the fund has earned over \$1.8 million. Ongoing projects are detailed at the Building Decatur website.<sup>122</sup>

In terms of economic development, two initiatives stand out. The first is Decatur Limitless, which self-identifies as a "movement" with a platform of advertising the benefits of Decatur. It is supported by the

<sup>115</sup> As identified by QuickFacts from the US Census Bureau. Please note that the QuickFacts data comes with the caveat, "This geographic level of poverty and health estimates are not comparable to other geographic levels of these estimates."

<sup>116</sup> The Decatur MSA covers the same area as Macon County.

<sup>117</sup> See 9.1.1.1.3 in the Appendix.

<sup>118</sup> Community Economic Toolbox. EconomicToolbox.mit.edu.

<sup>119</sup> *Industries not classified* also reports a high LQ (2.46).

<sup>120</sup> See 9.1.1.2 in the Appendix for employment by industry for Decatur, Illinois, and the US.

<sup>121</sup> "Local Motor Fuel Tax - City of Decatur, IL." 2017. Accessed April 25. <http://www.decaturil.gov/departments/finance/taax-information/fuel-tax/>.

<sup>122</sup> "City of Decatur - Motor Fuel Tax Road Projects." 2017. *Building Decatur*. Accessed April 25. <http://www.buildingdecatur.com/>.

Howard G. Buffett Foundation,<sup>123</sup> which was formed by Howard Buffett, Decatur resident and son of Warren. Decatur Limitless is bolstered by some of Decatur's recent successes, which include the revitalization of land near the lake, the dredging of Lake Decatur, and MIP.<sup>124</sup> The second is Grow Decatur, which is a citizen-led initiative to improve the Decatur economy<sup>127</sup> that started around 2012.<sup>125</sup> In fact, one of the *strategic imperatives* of Grow Decatur is the inland port.<sup>126</sup> Its main goals include: "quality of life" improvements, higher wages, population retention and growth, and more jobs.<sup>127</sup>

### 3.1.5 Assets

Decatur's potential lies in three types of assets: natural, institutional, and industrial. Its biggest natural asset is proximity to farmland, which, agricultural location theory tells us, is important to agricultural processors like ADM. In addition to this natural resource, Decatur has abundant institutional resources. It has two hospitals, Decatur Memorial and St. Mary's. ADM is the biggest employer in Macon County, with 4,199 employees. Decatur Memorial Hospital is the next biggest employer (2,200 employees), followed by Decatur Public Schools (1,812), Caterpillar, Inc. (1,650), St. Mary's Hospital (987), and Tate & Lyle (975).<sup>128</sup> Lastly, Decatur has industrial assets that stem from its major employers, such as ADM, Caterpillar, and Tate & Lyle. These assets derive from Decatur's transportation resources, like its three Class 1 railroads. Railroads have been present in Decatur since 1854.<sup>129</sup> Its industrial assets also benefit from a variety of economic incentives, including tax increment finance (TIF) districts, which allow development to be funded with tax revenue gains, and enterprise zones, which can reduce property taxes, among other possible outcomes.<sup>130</sup>

#### 3.1.5.1 Industrial History

Decatur has a robust industrial history. Shown in Figure 3—2, ADM's history in Decatur started in 1939 when it first developed a plant in the town.<sup>131</sup> By 1969, ADM's corporate headquarters had relocated to Decatur, along with its labs.<sup>132</sup> While ADM's manufacturing still takes place in Decatur, the headquarters relocated to Chicago in 2014.<sup>133</sup> A *Wall Street Journal* article explains the perspective of an employee in a downtown Decatur establishment: "In this town, everyone is connected to ADM in some way."<sup>134, 110</sup> This industrial heritage is undeniably linked to Decatur's transportation assets. As Chapman and Walker (1991) describe, "Most firms cannot contemplate building their own road or rail links. What is perhaps less immediately obvious is that, where the infrastructure is dense, competition gives alternatives and keeps costs down."<sup>135</sup> This notion of competition is especially evident in Decatur. Though not exhaustive, Figure 3—2 outlines the industrial and infrastructural history of Decatur. Decatur has been home to large industrial players even before 1909 when Staley, an agricultural

<sup>123</sup> "About." 2017. *Limitless Decatur & Macon County*. <http://www.limitlessdecatur.com/about/>.

<sup>124</sup> Lusvardi, Chris, and Allison Petty. 2015. "City Limitless Extols Decatur Area's Potential." *Herald & Review*, May 8. [http://herald-review.com/news/local/city-limitless-extols-decatur-area-s-potential/article\\_e3183d52-58a1-5c8a-904f-46c172bfa78e.html](http://herald-review.com/news/local/city-limitless-extols-decatur-area-s-potential/article_e3183d52-58a1-5c8a-904f-46c172bfa78e.html).

<sup>125</sup> Lusvardi, Chris. 2016. "Grow Decatur Gathering Wider Input." *Herald & Review*. [http://herald-review.com/news/local/grow-decatur-gathering-wider-input/article\\_cabobabe-b4a5-514a-a3cd-dc75faa651a2.html](http://herald-review.com/news/local/grow-decatur-gathering-wider-input/article_cabobabe-b4a5-514a-a3cd-dc75faa651a2.html).

<sup>126</sup> "Imperatives - GROW DECATUR." 2017. Accessed April 25. <http://www.growdecatur.org/imperatives.html>.

<sup>127</sup> "Who We Are - GROW DECATUR." 2017. Accessed April 25. <http://www.growdecatur.org/who-we-are.html>.

<sup>128</sup> "Industries Here." *Economic Development Corporation of Decatur and Macon County, Illinois*. Accessed March 30, 2017. <http://www.decaturedc.com/industries-here/>.

<sup>129</sup> Lusvardi, Chris. 2014. "No Matter What Time It Is, the Trains Are Rolling through Decatur." *Herald & Review*. [http://herald-review.com/no-matter-what-time-it-is-the-trains-are-rolling/article\\_57e61a69-1fe6-5e14-9bda-c96a18e0f5e8.html](http://herald-review.com/no-matter-what-time-it-is-the-trains-are-rolling/article_57e61a69-1fe6-5e14-9bda-c96a18e0f5e8.html).

<sup>130</sup> "Incentives." 2017. *Midwest Inland Port*.

<sup>131</sup> ADM. 2016. "ADM: History - 1920-1939." <http://www.adm.com/en-US/company/history/Pages/1920-1939.aspx>. Please note that this webpage no longer exists.

<sup>132</sup> ADM. 2016. "ADM: History - 1960-1979." <http://www.adm.com/en-US/company/history/Pages/1960-1979.aspx>. Please note that this webpage no longer exists.

<sup>133</sup> Karp, Gregory. 2014. "ADM Opens Its Chicago Headquarters." *Chicago Tribune*, August 26.

<sup>134</sup> Gasparro, Annie. 2013. "ADM Leaves Decatur With Little Town Blues." *The Wall Street Journal*, September 26.

<sup>135</sup> Chapman, Keith, and David F. Walker. *Industrial Location*. Cambridge: Basil Blackwell, 1991, p. 42.

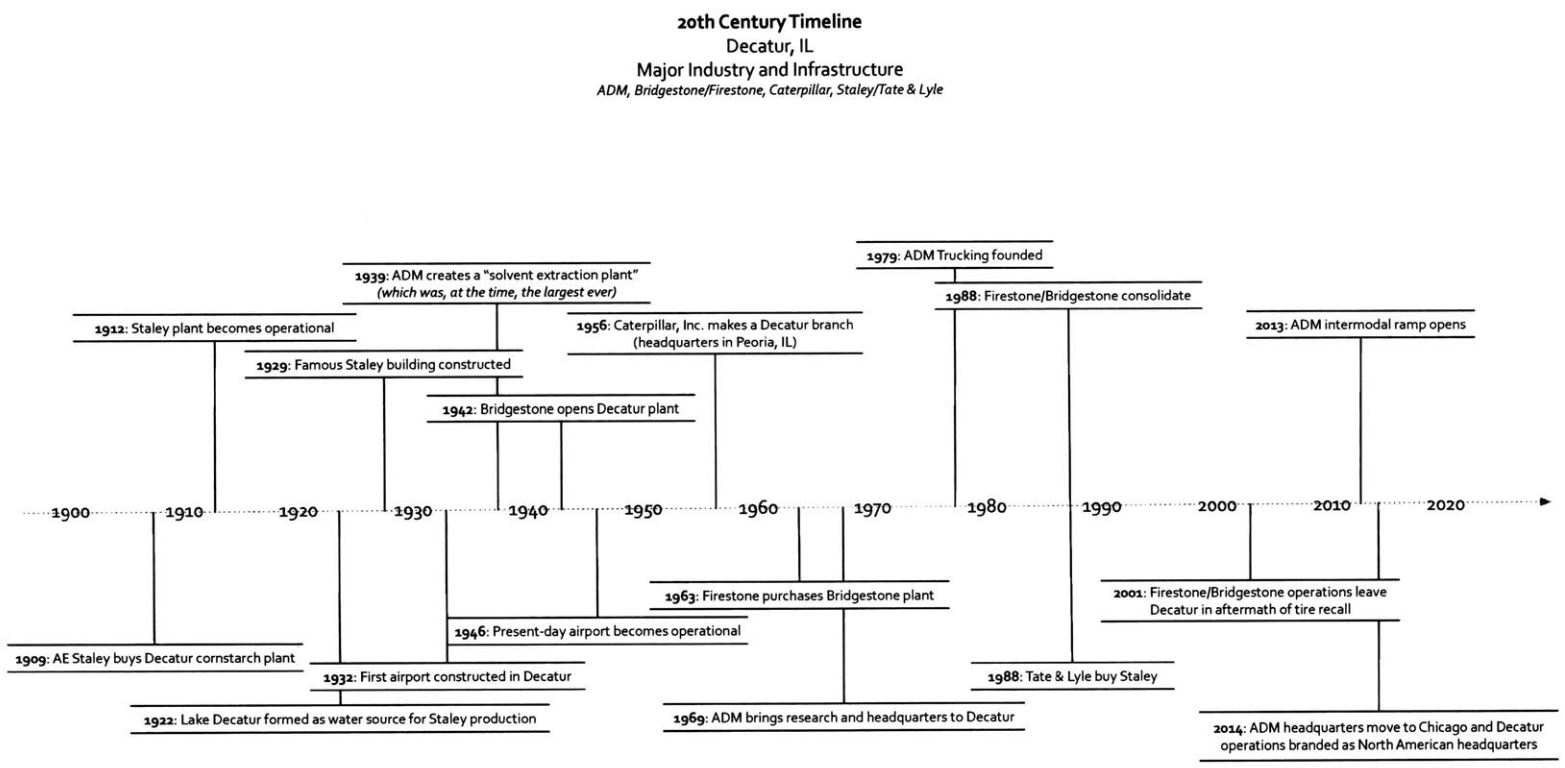
processor that was later consumed by Tate & Lyle, bought a cornstarch plant.<sup>136</sup> Since then, Caterpillar, ADM, Tate & Lyle, and Firestone/Bridgestone, among others, have maintained a presence in Decatur (though Firestone/Bridgestone left in 2001).

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<sup>136</sup> Mueller Co. has been in Decatur since 1857. See: "History." 2017. *Mueller Co.*



Figure 3—2: An (abbreviated) timeline of Decatur's industrial and infrastructure history.<sup>37</sup>



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<sup>37</sup> Please note that this timeline cites webpages that no longer exist.

### 3.1.6 Birth of MIP

The idea for an inland port in Decatur blossomed from Grow Decatur. It was a community-led endeavor, spearheaded by two people from Decatur, and economic development was one of the main motivators.<sup>138</sup> Originally, there were 18 stakeholders.<sup>139</sup> The official partners of MIP are known as the *Strategic Development Coalition*.<sup>140</sup> They include ADM; Ameren Illinois, an electric and gas company;<sup>141</sup> Clayco, a design-build company;<sup>142</sup> CN, a rail company; Illinois Department of Commerce and Economic Opportunity (DCEO); Decatur Memorial Hospital; and OmniTRAX, a short-line railroad company.<sup>140, 143</sup> The coalition partners are local and national, supporting the efforts of MIP<sup>144</sup> and validating it as a viable economic development strategy.

#### 3.1.6.1 ADM

ADM is a multi-national agricultural processor headquartered in Chicago, Illinois. ADM's business focuses primarily on oilseeds (e.g., soybean) and corn processing, and agricultural services, among others.<sup>145</sup> To accommodate these business areas and access the global market – ADM is informally known as the "Supermarket to the World"<sup>146</sup> – ADM's transportation arm is massive: the company's fleet, including both owned and leased vehicles, includes 31 ships, 2,500 barges, 400 trucks, over 1,400 trailers, and over 28,000 rail cars.<sup>147</sup> Since 1969, ADM has called Decatur home.<sup>148</sup> As mentioned above, ADM's Decatur operations employ 4,199 people, and it is the biggest employer in Macon County.<sup>140</sup>

In addition to its stronghold in Decatur, ADM has a strong presence in the state, country, and world. According to former governor of Illinois Pat Quinn, "ADM is one of the key reasons Illinois is the largest exporting state in the Midwest."<sup>149</sup> The 2016 Fortune 500 listed ADM at #41.<sup>150</sup> ADM reported revenues of \$67.7 million for FY2015, but these revenues were down more than 16% from the previous year.<sup>150</sup>

As the owner of MIP's infrastructure, ADM has assumed a critical – and permanent – role in the future of MIP. But why? First, MIP allows ADM to expand its logistics business. ADM Logistics identifies itself as "a third-party logistics provider with access to one of the most far-reaching transportation networks."<sup>151</sup> In addition to streamlining its exports, the development of MIP allows ADM to backhaul ("match-back") on railcars sent to Decatur with goods.<sup>144</sup> Second, MIP bolsters ADM against potentially vulnerable aspects of its business, like an over-supply of grain on the market.<sup>150</sup> Third, MIP helps to increase the attractiveness of central Illinois as a business area, and the proximity of new businesses could benefit ADM in the future. A recent strengths-weaknesses-opportunities-threats (SWOT) analysis by

<sup>138</sup> Email, Larry Altenbaumer, Strategic Advisor for MIP, 7 October 2016; Phone Call, Jennifer Bennett, Manager, Strategic Initiatives at ADM, 1 December 2016.

<sup>139</sup> Phone Call, Larry Altenbaumer, Strategic Advisor for MIP, 7 October 2016.

<sup>140</sup> Economic Development Corporation of Decatur & Macon County. 2016. "The Midwest Inland Port - Decatur, Illinois." <http://www.midwestinlandport.com/>; "Strategic Development Coalition." 2017.

<sup>141</sup> <https://www.ameren.com/illinois/about-us>

<sup>142</sup> <http://www.claycorp.com/>

<sup>143</sup> <http://omnitrax.com>; Phone Call, Larry Altenbaumer, Strategic Advisor for MIP, 7 October 2016.

<sup>144</sup> Conversation, Larry Altenbaumer, Strategic Advisor for MIP, 9 January 2017.

<sup>145</sup> "ADM: Facts," 2017. <http://www.adm.com/en-US/company/Facts/Pages/default.aspx>.

<sup>146</sup> Kahn, E.J. 1991. *Supermarketer to the World: The Story of Dwayne Andreas CEO of Archer Daniels Midland*. Time Warner Paperbacks, p. 3.

<sup>147</sup> "ADM: Facts," 2017. <http://www.adm.com/en-US/company/Facts/Pages/default.aspx>.

<sup>148</sup> "ADM: History." ADM, 2017. <http://www.adm.com/en-US/company/history/Pages/default.aspx>.

<sup>149</sup> "Governor Quinn Opens New ADM Intermodal Container Facility: Intermodal Ramp Offers Prime Rail and Roadway Access for Goods from All Businesses." *Illinois Government News Network*, 2013. <http://www3.illinois.gov/pressreleases/ShowPressRelease.cfm?SubjectID=2&RecNum=11568>.

<sup>150</sup> "Archer Daniels Midland (ADM) Stock Price, Financials and News (2016)." *Fortune 500*, 2017. <http://beta.fortune.com/fortune500/archer-daniels-midland-41>.

<sup>151</sup> ADM. "ADM: Logistics - Our Transportation Network," 2017. [http://www.adm.com/en-US/products/ADMLogistics/transportation\\_network/Pages/default.aspx](http://www.adm.com/en-US/products/ADMLogistics/transportation_network/Pages/default.aspx).

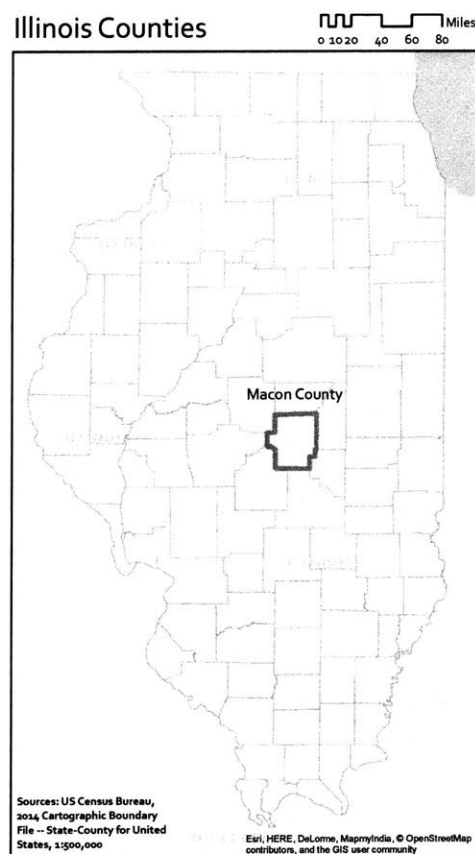
MarketLine identified one of ADM's key strengths as its logistics capacity in the industry, and one of ADM's threats as vulnerability to shifts in the region and economy.<sup>152</sup>

## 3.2 State of Illinois

### 3.2.1 Overview

I review the context at the state level to explain the state-level support for MIP. Figure 3—3 shows Macon County's central position relative to the rest of the state. I find that the primary sources of support at the state level arise from historic climate around industrial relations and the massive congestion problems facing the state in Chicago.

Figure 3—3: Macon County relative to Illinois.



### 3.2.2 Freight

Illinois is (literally) at the center of American freight movement. Rail has been present in Illinois since 1838.<sup>153</sup> Home to Chicago, which is considered the rail headquarters of the nation,<sup>154</sup> much of the Illinois economy revolves around freight. According to 2014 statistics, over 18,000 people in the state work in rail, both freight and passenger, and over 38,000 work for railroads in some capacity.<sup>155</sup> According to the Illinois Department of Commerce and Economic Opportunity (DCEO), there are two significant

<sup>152</sup> MarketLine. "Archer Daniels Midland Company SWOT Analysis," 2016. doi:518A1EDA-C390-4C2E-BFAC-5F6A14497DBD, p. 4.

<sup>153</sup> Westrom, Ryan J. 2014. "The Agglomerative Role of Transportation Investment: A Comparative Analysis of Portuguese and American High-Speed Rail Proposals." Massachusetts Institute of Technology, p. 27, citing the Wabash Railroad Historical Society (<http://www.wabashrhs.org/>).

<sup>154</sup> "CREATE." 2017. Accessed January 6. <http://www.createprogram.org/about.htm>.

<sup>155</sup> "CREATE Employment Fact Sheet." 2014. [http://www.createprogram.org/factsheets/Employment\\_Benefits\\_February\\_2014\\_FINAL.pdf](http://www.createprogram.org/factsheets/Employment_Benefits_February_2014_FINAL.pdf), p. 1.

inland ports in Illinois, MIP and America's Central Port (St. Louis).<sup>156</sup> According to the Chicago Metropolitan Agency for Planning's Intermodal (Rail-Truck) Freight Terminals dataset, there were 22 open intermodal facilities in Illinois in 2016.<sup>157</sup> However, the nation's freight reliance on Chicago has produced "the largest U.S. rail freight chokepoint."<sup>154</sup> In part, this is what the recent Chicago Region Environmental and Transportation Efficiency (CREATE) initiative intends to solve. CREATE aligns various levels of government – Chicago, Illinois, and the nation – with private sector actors, such as rail companies. It aims to bolster the rail network (freight and passenger) and alleviate congestion.<sup>158</sup> While MIP is not part of CREATE, CREATE provides an important backdrop for understanding downstate freight activity.

### 3.2.3 Industry

#### 3.2.3.1 Corporate Trends

Some describe Illinois as a "pay to play" state when it comes to corporate relations.<sup>159</sup> Good Jobs First, a policy research organization that focuses on corporations and employment,<sup>160</sup> has created both a Subsidy Tracker and a Violation Tracker through its Corporate Research Project for corporations in the US.<sup>161</sup> Overall, the states that award the most subsidies, by value, are New York, Louisiana, and Michigan (in order); Illinois is ranked 11<sup>th</sup> nationally in terms of the value of its subsidies. The states that award the most subsidies, in general, are New York, Washington, and California (in order); Illinois is ranked 16<sup>th</sup> nationally in terms of the amount of subsidies it awards.<sup>162</sup> This suggests that Illinois is not out of the ordinary compared to other states when it comes to the distribution of subsidies.

In terms of the total value of subsidies awarded, ADM is ranked eighth in the state of Illinois for parent companies receiving subsidies. But in terms of the amount of subsidies awarded in Illinois, it is ranked second.<sup>163</sup> According to Good Jobs First, ADM has received 11 subsidies, totaling over \$87.5 million, from the state of Illinois since 2004. It has also received subsidies from other states, including Iowa, Pennsylvania, and others, but the Illinois share makes up 72% of the incentives it receives at the state level. ADM has also received over \$177 million in federal tax breaks and grants.<sup>164</sup>

#### 3.2.3.2 Tax Credits

The Economic Development for a Growing Economy (EDGE) program exemplifies how the state of Illinois distributes incentives to corporations. In a Chicago Tribune editorial, it was described as primary way in which the state of Illinois encourages economic development.<sup>165</sup> Sponsored by the Department of Commerce and Economic Opportunity (DCEO),<sup>166</sup> EDGE provides tax credits to corporations in

<sup>156</sup> "Why Illinois: World Class Infrastructure." 2017. <https://www.illinois.gov/dceo/whyillinois/Pages/WorldClassInfrastructure.aspx>.

<sup>157</sup> "Intermodal (Rail-Truck) Freight Terminals in Illinois - Intermodal (Rail-Truck) Freight Terminals in Illinois, 2016 - CMAP Data Hub." 2017. *CMAP Data Hub*. [https://datahub.cmap.illinois.gov/ro/dataset/intermodal-rail-truck-freight-terminals-in-illinois/resource/cd7009be-6e27-4cc8-9806-5f124e69a0e7?inner\\_span=True](https://datahub.cmap.illinois.gov/ro/dataset/intermodal-rail-truck-freight-terminals-in-illinois/resource/cd7009be-6e27-4cc8-9806-5f124e69a0e7?inner_span=True).

<sup>158</sup> "CREATE Fact Sheet." 2017. [http://www.createprogram.org/factsheets/CREATE\\_brochure\\_2017.pdf](http://www.createprogram.org/factsheets/CREATE_brochure_2017.pdf).

<sup>159</sup> Lucci, Michael. 2013. "ADM Relocates to Chicago – without State Tax Incentives." *Illinois Policy*. <https://www.illinoispolicy.org/admin-relocates-to-chicago-without-state-tax-incentives/>.

<sup>160</sup> "About Us." *Good Jobs First*, 2017.

<sup>161</sup> "Violation Tracker User Guide | Good Jobs First." *Corporate Research Project: Good Jobs First Violation Tracker User Guide*, 2017; "Subsidy Tracker User Guide | Good Jobs First." *Corporate Research Project: Good Jobs First Subsidy Tracker User Guide*, 2016. <http://www.goodjobsfirst.org/subsidy-tracker-user-guide>.

<sup>162</sup> "Subsidy Tracker Top States." 2015. *Corporate Research Project: Subsidy Tracker*.

<sup>163</sup> "Subsidy Tracker Summary of State and Local Awards | Illinois." *Corporate Research Project: Subsidy Tracker*, 2015.

<sup>164</sup> "Archer Daniels Midland | Good Jobs First." 2015. *Subsidy Tracker Parent Company Subsidy*. <http://subsidytracker.goodjobsfirst.org/prog.php?parent=archer-daniels-midland>.

<sup>165</sup> *Chicago Tribune*. 2013. "Editorial: Illinois Tax Incentives and the next ADM," December 19. [http://articles.chicagotribune.com/2013-12-19/opinion/ct-illinois-tax-incentives-edit-1219-jm-20131219\\_1\\_tax-incentives-edge-credits-tax-breaks](http://articles.chicagotribune.com/2013-12-19/opinion/ct-illinois-tax-incentives-edit-1219-jm-20131219_1_tax-incentives-edge-credits-tax-breaks).

<sup>166</sup> "2015 Economic Development for a Growing Economy (EDGE) Tax Credit Program Annual Report." Springfield, 2015. <https://www.illinois.gov/dceo/AboutDCEO/ReportsRequiredByStatute/FinalDraftof2015EDGEAnnualReport.pdf>, p. 3.

return for “capital investments” and the generation of full-time employment.<sup>167</sup> A DCEO employee affirms that EDGE is the primary vehicle for corporate tax credits in Illinois.<sup>168</sup>

A main justification for EDGE is global competition. Illinois corporate tax rates are some of the most intense,<sup>159</sup> and additional barriers to corporations exist in the form of registration costs and property taxes.<sup>168</sup> The state of Illinois views EDGE as simply “level[ing] the playing field.”<sup>167</sup> But despite the presence of EDGE, Illinois is still considered at a “disadvantage” compared to its Midwestern neighbors.<sup>169</sup> EDGE officially ended in 2016<sup>170</sup> but has been extended until the end of April 2017.<sup>171</sup> The program received criticism for its cost,<sup>170</sup> as well as its persistent exploitation by Illinois corporations.<sup>172</sup> Under consideration for replacing EDGE is Transforming, Helping and Reviving Illinois' Versatile Economy (THRIVE). THRIVE is structured similarly to EDGE but provides a smaller percentage tax credit.<sup>170</sup>

### 3.2.3.3 Grants

Illinois supports intermodal facilities with a dedicated funding stream. The Intermodal Facilities Promotion Act, approved in 2009, created an Intermodal Facilities Promotion Fund, which is capitalized by the income taxes from intermodal facility-related employment.<sup>173</sup> However, ADM utilized a different source – the Emerging Technological Enterprises Grant. I review ADM’s grant application and agreement to enumerate the original justification for the ramp and cite any metrics that were used to explain its anticipated benefit.

#### 3.2.3.3.1 ADM’s Grant for the Intermodal Ramp

ADM received a \$750,000 grant from the state of Illinois. I submitted a Freedom of Information Act (FOIA) request to the Illinois DCEO to access the grant application, grant agreement, any Requests for Proposals (RFPs), and any tax credit agreements between DCEO and ADM.<sup>174</sup> I examine the grant application and agreement in detail to enumerate the original expectations of the intermodal ramp. The grant program through which ADM received funding, Emerging Technological Enterprises, is no longer operational,<sup>175</sup> but the application and agreement help explain the expectations of ADM as a grant recipient. However, generally, the grant application and review processes from DCEO vary by circumstance.<sup>168</sup>

The Emerging Technological Enterprises Grant is issued through the Illinois Department of Commerce and Economic Opportunity. The objectives for this program include increased exports, “economic development ... in key sectors,” and high return on investment for the public sector. *Agro / Food Services* are listed as one of the “preferred” industries.<sup>176</sup> The grant award ceiling is \$2 million, and grants are capped at one-quarter of the overall project cost.<sup>177</sup> Selection factors include project relevance,

<sup>167</sup> “2015 Economic Development for a Growing Economy (EDGE) Tax Credit Program Annual Report.” Springfield, 2015. <https://www.illinois.gov/dceo/AboutDCEO/ReportsRequiredByStatute/FinalDraftof2015EDGEAnnualReport.pdf>, p. 2.

<sup>168</sup> Email, DCEO employee, 9 May 2017.

<sup>169</sup> “2015 Economic Development for a Growing Economy (EDGE) Tax Credit Program Annual Report.” Springfield, 2015. <https://www.illinois.gov/dceo/AboutDCEO/ReportsRequiredByStatute/FinalDraftof2015EDGEAnnualReport.pdf>, p. 4.

<sup>170</sup> Marotti, Ally. “Illinois EDGE Jobs Program Could See New Life.” *Chicago Tribune*, January 6, 2014. <http://www.chicagotribune.com/business/ct-edge-tax-credit-extension-0107-biz-20170106-story.html>.

<sup>171</sup> Hinz, Greg. 2017. “Illinois Moves to Regain Its Edge.” *Crain’s Chicago Business*, January 10.

<sup>172</sup> Berens, Michael J., and Ray Long. “Illinois Businesses Get Lucrative EDGE Tax Breaks, Fall Short of Job Goals.” *Chicago Tribune*. October 2, 2015. <http://www.chicagotribune.com/news/watchdog/ct-illinois-corporate-tax-breaks-met-20151002-story.html>.

<sup>173</sup> “Illinois Law Provides Funds for Intermodal Facilities.” *Progressive Railroading*, 2009. [http://www.progressiverailroading.com/rail\\_industry\\_trends/news/illinois-law-provides-funds-for-intermodal-facilities--21274](http://www.progressiverailroading.com/rail_industry_trends/news/illinois-law-provides-funds-for-intermodal-facilities--21274).

<sup>174</sup> See 9.1.2 in the Appendix.

<sup>175</sup> Email, DCEO employee, 5 April 2017.

<sup>176</sup> ADM Grant Application to Illinois DCEO, Grant #13-202002, p. 2.

<sup>177</sup> ADM Grant Application to Illinois DCEO, Grant #13-202002, p. 4.

feasibility, job retention and generation forecasts, capability of applicants on follow-through, the use of capital from the private sector and possibly federal government, and "*the potential for adapting, commercializing or adopting the results of the applicant's project for the economic benefit of the state.*"<sup>178</sup> The DCEO director made selections.<sup>179</sup>

ADM applied for an Emerging Technological Enterprises Grant in March 2012.<sup>180</sup> The project was entitled, "Build Intermodal Ramp while Developing Site to Support Additional Rail Infrastructure for Overhead Conveyor." Jim Bobbit, who was, at the time, Director of North American Rail Operations for ADM, was the signatory on the grant application. The overall project cost was estimated at \$4.95 million, of which the application asked for \$750,000 (15%) in the form of a grant.<sup>181</sup> In November 2012, ADM received a successful response to its grant application and was awarded the total requested amount.<sup>182</sup> The grant agreement consists of a *budget, scope of work, grant fund control requirements, terms and conditions, general provisions, and certifications.*<sup>183</sup>

There were two components to the project. Part 1 was the intermodal ramp "on ADM property," and Part 2 was preliminary work to facilitate the installation of a soybean conveyor from the ramp to an ADM plant. The application describes the impact of Part 1 as: market expansion for ADM and others; decreased drayage by one-third; and decreased drayage from St. Louis, Indianapolis, and Chicago for unoccupied containers.<sup>184</sup> For each, current and possible future statistics are cited. The application describes the impact of Part 2 as positive for soybean and soybean meal movements, with statistics on efficiency metrics for unloading, with other local benefits described as a result of efficiency gains. The application describes how ADM's previous use of Norfolk Southern's intermodal facility stops traffic on average 10 minutes, six times daily.<sup>185</sup>

In terms of performance measures, the only item listed is "number of intermodal boxes handled," with a goal of "6,000+ containers." In terms of employment, it is estimated that 3-4 "permanent full-time jobs ... would be created" and 4 "permanent full-time jobs ... would be retained."<sup>186</sup> ADM summarizes the communal benefits of the project as "improved regional access to international markets, reduced road congestion, and a reduction of carbon emissions." The listed beneficiaries are the state, the region, and ADM.<sup>187</sup>

The grant period ran from October 2012 through the end of September 2013, but the construction and project was finished by June 2013.<sup>188</sup> ADM was required to submit quarterly and financial project updates.<sup>182</sup> Due to the project's completion over the summer, ADM submitted three quarterly reports instead of four. The entirety of the grant award (\$750,000) was allocated to construction costs.<sup>189</sup> In the first quarter of the grant period (September through December 2012), ADM reports the creation of 10 construction jobs, which are considered temporary full-time employment. In total, the annualized

<sup>178</sup> Emphasis added by author.

<sup>179</sup> ADM Grant Application to Illinois DCEO, Grant #13-202002, p. 5.

<sup>180</sup> ADM Grant Application to Illinois DCEO, Grant #13-202002, p. 6.

<sup>181</sup> ADM Grant Application to Illinois DCEO, Grant #13-202002, p. 8.

<sup>182</sup> Grant Agreement, Grant #13-202002, p. iii.

<sup>183</sup> Grant Agreement, Grant #13-202002, p. 2.

<sup>184</sup> ADM Grant Application to Illinois DCEO, Grant #13-202002, p. ii.

<sup>185</sup> ADM Grant Application to Illinois DCEO, Grant #13-202002, p. ii-iii.

<sup>186</sup> ADM Grant Application to Illinois DCEO, Grant #13-202002, p. 10.

<sup>187</sup> ADM Grant Application to Illinois DCEO, Grant #13-202002, p. iii.

<sup>188</sup> Final Project Status Report, Grant #13-202002, p. 3.

<sup>189</sup> Grant Agreement, Grant #13-202002, p. 5.

wages of these jobs were \$836,056.<sup>190</sup> In the Final Project Report (July 2013), ADM reports having invested \$5.4 million of its own money,<sup>191</sup> a 29% increase from the original estimate of \$4.2 million. These figures put the total cost of the project at \$6.15 million.

#### 3.2.3.3.1.1 *Key Takeaways*

The biggest takeaway from the grant application and agreement is that there was no impact assessment submitted with the application, nor was one required as part of the project's financial and status reports. The project's status reports outline job creation and wages associated with the jobs, but nothing else. A second takeaway is that one of the grant selection factors outlines a willingness, on the part of the applicant, to utilize the funded project for public good. This raises the question of how and when the subject of the inland port was broached, and whether ADM volunteered its infrastructure for the sake of the public good.

### 3.3 Summary

I provide a non-comprehensive overview of local and state-level facilitating factors. Local and state-level factors encouraged the development of MIP. At the county level, Macon's struggling economy and changing population led to a local support for MIP, which was further supported by its existing assets and partnership with ADM. At the state level, MIP could aid Chicago's overburdened freight network, and the historic industrial relations climate in Illinois may have indirectly facilitated ADM's grant request.

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<sup>190</sup> DCEO Job Count FTE Certification Form, Grant #13-202002; Project Status Report #1, Grant #13-202002, p. 2.

<sup>191</sup> Final Project Status Report, Grant #13-202002, p. 3.

## 4 Proposed Methodology

*"We hope others see the impact the Midwest Inland Port has had." – Kara Demirjian Huss, VP of T/CCI, which touts MIP-induced transportation cost savings of \$400,000.<sup>192</sup>*

### 4.1 Overview

I propose a multi-scale transportation and economic impact assessment. I investigate the effect of MIP on freight movements; earnings, firms, and employment; and local congestion and commutes. I approach the impact assessment from the local, regional, and state levels, using a point-in-time analysis to compare 2007 and 2014. I use the Champaign-Urbana Business Economic Area (BEA), in which Macon County is located, as a proxy for the region. I conduct a multi-scale impact assessment given the variable potential degree of impact of MIP. I select 2007 and 2014 for two reasons. First, the ADM intermodal ramp opened in 2013, and 2007 and 2014 provide a range for analyzing pre- and post-project conditions of MIP, recognizing the limitations to obtaining data past 2014 at the time of writing. Second, 2007 and 2014 are both relative "peak" economic years, which makes their comparison valid. However, these two years straddle one of the most serious economic crises of the last several decades, which certainly influences the findings from the 2014 analysis.<sup>193</sup>

My multi-scale analysis answers the following questions:

1. At the **state level**, I visualize the rail waybill data to show how rail shipments to business economic areas (BEAs) have structurally changed from 2007 to 2014. I ask: *How have rail shipments to BEAs changed from 2007 to 2014? How have they changed in Illinois-spanning BEAs?*
2. At the **regional level**, for the Champaign-Urbana Business Economic Area (BEA), I examine the change in jobs for each county, compare the change in wages for jobs and residents, and investigate the change in firm age from 2007 to 2014. I ask: *How have jobs changed across the Champaign-Urbana BEA as a whole and in specific counties, by industry? How have wages changed by industry, and how have they changed for residents and workers? How have young firms contributed to local employment, by industry?*
3. At the **local level**, I examine the change from 2007 to 2014 in the local street network's congestion, as experienced by a motorist, by utilizing IDOT railroad crossing data, and I speculate on how this local congestion could affect commutes. I ask: *Has local congestion improved or worsened from 2007 to 2014, and how might this improvement or worsening affect commutes?*

As a qualifier, these "impacts" are not due to MIP alone. There are many factors that could be contributing. However, I argue that these scales – state, region, and county – demonstrate the different *potential* levels of impact. My impact assessment is preliminary and not necessarily conclusive, nor does it prove causality between MIP and the determined outcomes.

<sup>192</sup> Lusvardi, Chris. 2016. "Decatur Looking to Build on Midwest Inland Port Potential | Local | Herald-Review.com." *Herald & Review*. [http://herald-review.com/business/local/decatur-looking-to-build-on-midwest-inland-port-potential/article\\_76fafde3-b9f3-53c9-af74-efc0e442e127.html](http://herald-review.com/business/local/decatur-looking-to-build-on-midwest-inland-port-potential/article_76fafde3-b9f3-53c9-af74-efc0e442e127.html).

<sup>193</sup> Amadeo, Kimberly. 2017. "2008 Financial Crisis: Causes, Costs and Could It Reoccur?" *The Balance*.



An overview of the method is shown in Table 4—1.

Table 4—1: Methodological overview.

	Theoretical Orientation	Data Sources	Method
<p><b>State</b></p> <p><i>How have rail shipments to Illinois and the Champaign-Urbana BEA changed from 2007 to 2014?</i></p>	Graph Theory	1. Public Use Waybill Survey (PUWS)	Network Analysis of PUWS in GEPHI
<p><b>Region</b></p> <p><i>How have jobs, earnings, and young firms changed by 2-digit NAICS industry code in the Champaign-Urbana BEA from 2007 to 2014?</i></p>	Location Theory	1. US Census Bureau County Business Patterns 2. Bureau of Labor Statistics' Characteristics of the Employed 3. QWI 4. Bureau of Economic Analysis' Economic Profile	1. Shift-Share Analysis 2. Earnings Analysis 3. Firm Analysis
<p><b>County</b></p> <p><i>How are train crossing delays distributed locally, how has congestion changed, and how might this affect local commutes?</i></p>	Graph Theory	1. IDOT Railroad Crossing Data 2. OpenStreetMap (OSM) 3. OnTheMap (LODES)	1. "Gate Down Time" Analysis 2. Network Analyst in ArcGIS 3. Visualization of Commutes in GEPHI

## 4.2 Method, by Scale

### 4.2.1 State

#### 4.2.1.1 Data

The purpose of this analysis is to understand how rail shipments have changed over time with respect to their metropolitan area origins and destinations. To do this, I utilize the Public Use Waybill Survey (PUWS), which is compiled by the Surface Transportation Board (STB). STB is a government body that manages and oversees the nation's railroads' transactions and unit costs.<sup>194</sup> STB's responsibilities include the assembly of the Carload Waybill Sample dataset, which compiles the waybills, or receipts, of rail shipments. Railroads with at least "4,500 revenue carloads" each year must report their waybills.<sup>195</sup> The complete dataset has restricted access due to the proprietary nature of the waybills, but an anonymous sample of the dataset is publicized as PUWS.<sup>195</sup> PUWS takes the form of an origin-termination dataset for rail shipments.

<sup>194</sup> "Surface Transportation Board." 2017. *USA.gov*. Accessed February 12. <https://www.usa.gov/federal-agencies/surface-transportation-board>

<sup>195</sup> "Industry Data > Economic Data: Waybill." 2017. *Surface Transportation Board*. Accessed January 5. [https://www.stb.gov/stb/industry/econ\\_waybill.html](https://www.stb.gov/stb/industry/econ_waybill.html).

#### 4.2.1.2 Method

My process consists of three parts. First, I aggregate the business economic areas and calculate the latitude and longitude of the centroid in ArcGIS.<sup>196</sup> Second, I create "nodes" and "edges" – the nodes are metro areas, determined by their centroid, and the edges are the shipments (as listed in the waybill data) with origins and destinations, weighted by the provided expansion factor.<sup>197</sup> I include all types of shipments, not just intermodal shipments, to examine high-level trends in rail movements. Third, I model the nodes and edges as a network in GEPHI, a free software for network visualization.

#### 4.2.1.3 Limitations

PUWS is valuable for understanding and visualizing the freight rail network in the US, but it comes with several major limitations. As discussed in the 2014 Reference Guide, significant limitations to the waybill data include: the sampling rate,<sup>198</sup> records for more than one car,<sup>199</sup> anonymized revenues,<sup>200</sup> differences between true weight and billed weight,<sup>201</sup> and rebilling concerns.<sup>202</sup> Because this analysis is meant to be illustrative, I do not feel that these limitations negate my results, especially as I did not use recorded revenues or tonnage. However, I did not take into account any rebilling issues, which could distort the accuracy of the true origins and destinations of the shipments. Furthermore, it would be beneficial to examine intermodal container movements alone, in addition to the aggregate rail shipments.

### 4.2.2 Region

#### 4.2.2.1 Data

The purpose of this analysis is to understand how jobs are changing across the region, especially given the potential for MIP to bring new business to Macon County and the surrounding area. I use a variety of government-sponsored data sources, including the US Census Bureau's County Business Patterns, QWI data accessed through the LED Extraction Tool, the Bureau of Economic Analysis' Economic Profile, and the Bureau of Labor Statistics' Characteristics of the Employed.

County Business Patterns data is derived from the US Census Bureau's Business Registrar.<sup>203</sup> The BLS Characteristics of the Employed data comes from the Current Population Survey (CPS), which is administered monthly by the US Census Bureau. The Characteristics of the Employed are aggregated to annual average values.<sup>204</sup> Quarterly Workforce Indicators (QWI) are US Census-derived figures on local jobs. They are compiled through the Local Employment Dynamics.<sup>205</sup> QWI data places an implicit, but anonymous, tag on workers, which connects them directly to their workplaces.<sup>205</sup> QWI data reveals

<sup>196</sup> I use the Stanford EarthWorks 2011 US BEA Economic Areas shapefile, published by the US Bureau of Transportation Statistics, to calculate the centroid of each BEA.

<sup>197</sup> The field name is "Theoretical Expansion Factor."

<sup>198</sup> "2014 Surface Transportation Board Carload Waybill Sample Reference Guide." 2016. Railinc Business Service. [https://www.stb.gov/stb/docs/Waybill/Revised 2014 STB Waybill Reference Guide.pdf](https://www.stb.gov/stb/docs/Waybill/Revised%202014%20STB%20Waybill%20Reference%20Guide.pdf), p. 174.

<sup>199</sup> "2014 Surface Transportation Board Carload Waybill Sample Reference Guide." 2016. Railinc Business Service. [https://www.stb.gov/stb/docs/Waybill/Revised 2014 STB Waybill Reference Guide.pdf](https://www.stb.gov/stb/docs/Waybill/Revised%202014%20STB%20Waybill%20Reference%20Guide.pdf), p. 175.

<sup>200</sup> "2014 Surface Transportation Board Carload Waybill Sample Reference Guide." 2016. Railinc Business Service. [https://www.stb.gov/stb/docs/Waybill/Revised 2014 STB Waybill Reference Guide.pdf](https://www.stb.gov/stb/docs/Waybill/Revised%202014%20STB%20Waybill%20Reference%20Guide.pdf), p. 176.

<sup>201</sup> "2014 Surface Transportation Board Carload Waybill Sample Reference Guide." 2016. Railinc Business Service. [https://www.stb.gov/stb/docs/Waybill/Revised 2014 STB Waybill Reference Guide.pdf](https://www.stb.gov/stb/docs/Waybill/Revised%202014%20STB%20Waybill%20Reference%20Guide.pdf), p. 177.

<sup>202</sup> "2014 Surface Transportation Board Carload Waybill Sample Reference Guide." 2016. Railinc Business Service. [https://www.stb.gov/stb/docs/Waybill/Revised 2014 STB Waybill Reference Guide.pdf](https://www.stb.gov/stb/docs/Waybill/Revised%202014%20STB%20Waybill%20Reference%20Guide.pdf), p. 178.

<sup>203</sup> "County Business Patterns (CBP) | About This Program." 2016. *US Census Bureau*. <https://www.census.gov/programs-surveys/cbp/about.html>.

<sup>204</sup> "Labor Force Statistics from the Current Population Survey." 2017. *Bureau of Labor Statistics*. <https://www.bls.gov/cps/tables.htm#charemp>.

<sup>205</sup> "Quarterly Workforce Indicators 101: Local Employment Dynamics." United States Census Bureau, 2015, p. 2-3.

information about job "flows" and demographics.<sup>205</sup> QWI data comes from Business Dynamics Statistics (BDS), the Quarterly Census of Employment and Wages (QCEW), Unemployment Insurance (UI) payments, and demographic information, as well as the Longitudinal Employer-Household Dynamic (LEHD).<sup>205</sup> The Bureau of Economic Analysis Economic Profile data for Local Area Personal Income tends to come from government agency data, US Census Bureau data, and surveys from various government agencies.<sup>206</sup>

#### 4.2.2.2 Method

I conduct three employment-related analyses. First, I utilize a **shift-share analysis** to show how jobs have changed in each county from 2007 to 2014. Second, I conduct an **earnings analysis** to evaluate how earnings have changed for residents and for workers in each county. Third, I conduct a **firm analysis** to examine how "young firms" have entered the market in each county.

**Shift-share analysis** identifies how the composition of an economy has changed from 2007 to 2014, and from which sources (national trends, the local advantages or disadvantages, and changes in specific industries) the changes result.<sup>207</sup>

The **earnings analysis** consists of three parts, each carried out for 2007 and 2014.

1. I determine the share of full-time employment by (approximate) two-digit NAICS industry to discern predominantly full-time industries at the national level. (I do this to avoid wage distortion from part-time work.)
2. I calculate annual average earnings for each predominantly full-time industry for each county, using QWI data.
3. I compare average earnings per job to resident per capita net earnings for each county.

The **firm analysis** examines how, for private firms, the employment by firm age and industry is changing, and how "young" firms contribute to job creation. I define "young" firms as ones that are 0-3 years old. I carried out each of these with pivot tables.

#### 4.2.2.3 Limitations

There are several limitations that must be addressed. For the earnings analysis, the method I used to split the industries could affect the results. For the wage and firm analysis, possible issues with the underlying QWI data include suppressed and fuzzy values for certain entries. In the context of per capita income, the "Local Area Personal Income Methodology" report describes the effect of institutions, which skews resident values down compared to worker values. Population fluctuations are another possible source of bias.<sup>208</sup> Furthermore, it would be beneficial to examine intermodal types of employment alongside general employment, earnings, and job creation trends.

### 4.2.3 County

#### 4.2.3.1 Data

The freight network for the nation, as well as state of Illinois, presents a high-level overview of origin-destination patterns in rail freight movements. This analysis does not address whether last-mile freight shipments happen in Macon County. Instead, it addresses how the county's freight infrastructure – e.g., rail and railroad crossings – affects the average Macon County resident through a localized network

<sup>206</sup> "Local Area Personal Income Methodology." 2016. Bureau of Economic Analysis. <https://www.bea.gov/regional/pdf/lapi2015.pdf>, p. I-12 – 13.

<sup>207</sup> Community Economic Toolbox. EconomicToolbox.mit.edu.

<sup>208</sup> "Local Area Personal Income Methodology." 2016. Bureau of Economic Analysis. <https://www.bea.gov/regional/pdf/lapi2015.pdf>, p. I-10.

analysis. For this analysis, I utilize an OpenStreetMap (OSM) street network and Network Analyst in ArcGIS. I incorporate expected delay times at railroad crossings using data from the Illinois Department of Transportation (IDOT).<sup>209</sup> I use OnTheMap (LEHD Origin-Destination Employer Statistics) to investigate commuting patterns.

#### 4.2.3.2 Method

First, I conduct a **local congestion** analysis. Second, I analyze **commute patterns**.

The **local congestion** analysis consists of two components. The first is the computation of the expected delay at railroad crossings, and the second is the generation of the drive time areas using an OSM dataset.

1. Computing the Expected Delay: To account for potential railroad crossing delays, I calculated the expected maximum delay to a motorist for each railroad crossing in Macon County. This serves as an "added cost" at all railroad crossings in Macon County. The expected delay to a motorist is zero if a train is not passing through the crossing. The expected delay to a motorist is equal to the time that the gate is closed (or "down") if a train is passing.

I adapt the method used by the Illinois Commerce Commission (ICC) (2002) to calculate how long it takes a train to pass through a crossing, or the delay to traffic induced by the passing train. ICC computes this metric, "gate down time,"<sup>210</sup> to determine the total motorist delay due to grade railroad crossings in the Chicago metropolitan area. ICC calculates this as the "total length of all freights [divided by the] speed of the train in feet per minute."<sup>211</sup>

$$\text{Gate Down Time} = \frac{\text{Total Freight Train Length}}{\text{Average Speed} \left[ \frac{\text{feet}}{\text{minute}} \right]} = \frac{\text{Number of Daily Trains} * \text{Train Length}}{\text{Average Speed} \left[ \frac{\text{feet}}{\text{minute}} \right]}$$

To calculate the freight gate down time, I convert the average speed of the trains from miles per hour to feet per minute.<sup>212</sup> I use the ICC estimate of 7,000 feet for the length of a main line freight train,<sup>213</sup> and I estimate (based on ICC's estimates) 3,500 for all other trains and multiply this length, in feet, per train by the total number of trains per day passing through the crossing.<sup>214</sup> (I did not use a weighting factor, as did ICC, to intensify the gate down time at terminal-adjacent crossings.<sup>215</sup>)

I then assume that the likelihood of the gate being down is uniformly distributed throughout the day. Using conditional expectation, the expected railroad delay equals the probability of the gate being down multiplied by the time the gate is down in a day (plus the probability of the gate not being down multiplied by the delay in this case, which is zero minutes).

<sup>209</sup> IDOT. n.d. "Illinois Technology Transfer."

<sup>210</sup> "Motorist Delay at Public Highway – Rail Grade Crossings In Northeastern Illinois." Springfield, 2002. <http://www.cmap.illinois.gov/documents/10180/29236/021114rrdelay1.pdf>, p. 6.

<sup>211</sup> "Motorist Delay at Public Highway – Rail Grade Crossings In Northeastern Illinois." Springfield, 2002. <http://www.cmap.illinois.gov/documents/10180/29236/021114rrdelay1.pdf>, p. 13.

<sup>212</sup> I calculate the average speed in miles per hour as the average of the maximum typical speed and minimum typical speed.

<sup>213</sup> "Motorist Delay at Public Highway – Rail Grade Crossings In Northeastern Illinois." Springfield, 2002. <http://www.cmap.illinois.gov/documents/10180/29236/021114rrdelay1.pdf>, p. 8.

<sup>214</sup> Please note that I used 7,000 feet as the train length estimate if there was at least one main line track at the crossing. I used 3,500 feet as the train length estimate if there were zero main line tracks at the crossing.

<sup>215</sup> "Motorist Delay at Public Highway – Rail Grade Crossings In Northeastern Illinois." Springfield, 2002. <http://www.cmap.illinois.gov/documents/10180/29236/021114rrdelay1.pdf>, p. 12.

$$P(\text{Gate is Down}) = \frac{\text{Gate Down Time [minutes]}}{1,440 \text{ minutes}^{216}}$$

$$E[\text{RRX Delay}] = P(\text{Gate is Down}) * \text{Gate Down Time}$$

As a qualifier, I am calculating the expected *maximum* delay for a motorist at a given crossing. (Motorists arriving after the train has already started to pass through the crossing would not have to wait as long as those that arrived just as the train was starting to cross.)

2. Generating Drive Time Areas: To determine the change in local congestion, I create an OSM street network to use in Network Analyst in ArcGIS.<sup>217</sup> This allows us to view “drive time” areas – how far a motorist can drive in a certain amount of time. I add in the expected motorist delay at the railroad crossings as an added cost. I generate trimmed, detailed polygons for the drive sheds.

The **commute pattern** analysis consists of visualizing commute data from OnTheMap in GEPHI.<sup>218</sup> I calculate county centroids in ArcGIS to develop the nodes, and edges are drawn from Macon to counties of work.

#### 4.2.3.3 Limitations

The major limitations with analysis have to do with the underlying assumptions I made. As a qualifier, this is certainly an oversimplification to the expected delay that a motorist would experience. This analysis ignores temporal issues, car arrival issues and queuing<sup>211</sup> (as I calculated this expectation as the *maximum* expected wait time), and grossly oversimplifies what an expected delay looks like, as the trains are realistically not uniformly distributed throughout the day. Furthermore, this expected delay is an upper bound on the expected delay because I assume all trains are at least 3,500 feet long. Many of the trains in Decatur could very well be shorter local trains. As such, my approach over-estimates local congestion in Macon County. There are also limitations to my use of “commute” data from OnTheMap. This “commute” is not representative of home-work trips *each day*.<sup>219</sup> Instead, it represents places of residence and places of work.

<sup>216</sup> Number of minutes in a day.

<sup>217</sup> “Create a Network Dataset from OSM Data.” 2013. *GitHub*; Tereshenkov. 2015. “Build an ArcGIS Network Dataset from OpenStreetMap.” <https://tereshenkov.wordpress.com/2015/02/20/build-arcgis-network-dataset-from-openstreetmap/>; cloveman2. 2016. “ArcGIS Editor for OSM 10.4.x Desktop.” *ArcGIS*. <https://www.arcgis.com/home/item.html?id=c18d3d0d5c62465db60f89225fdd2698>.

<sup>218</sup> US Census Bureau. 2016. OnTheMap Application. Longitudinal-Employer Household Dynamics Program. <http://onthemap.ces.census.gov/>.

<sup>219</sup> Moskowitz, Rachel, Ashley Leach, and Adam Garcia. “Accessing Employment Data for Counties and Smaller Geographies.” *Regional Review* 5, no. 2 (2015): 54, p. 30.

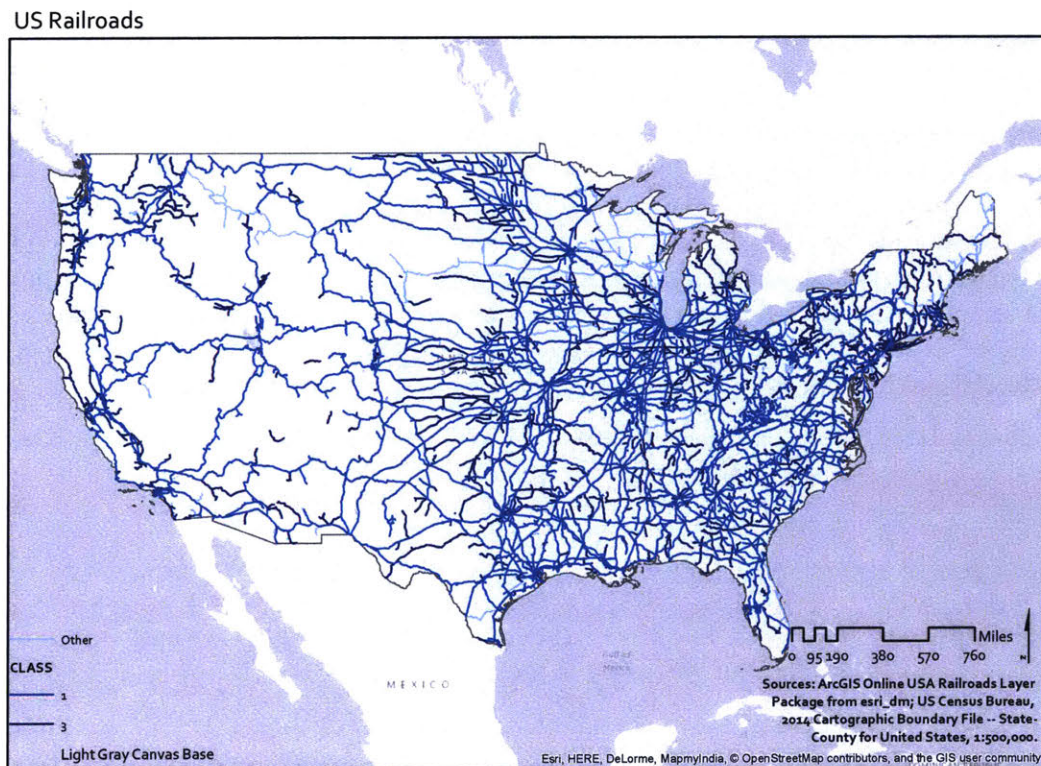
## 5 State-Level Analysis

*"Abraham Lincoln, the Great Emancipator, found purpose here, split rails here, went broke here, married here, practiced law here, fathered and buried children here, debated here, and lost and won and lost and won elections here."<sup>220</sup>*

### 5.1 Overview

To visualize the nation's rail freight movements, I utilize the Public Use Waybill Survey (PUWS) data, which is provided by the Surface Transportation Board (STB). PUWS aggregates shipments to Business Economic Areas (BEAs). In this section, I aim to answer the following questions: *How have rail shipments changed in Illinois-spanning BEAs?* I expect to find that rail shipments have, generally, increased. To provide a realistic foundation for network density, Figure 5—1 shows the landscape of railroads in the nation, demonstrating that the Midwest – especially Chicago – is by far the most-rail-dense part of the country.

Figure 5—1: US railroads, by class.



<sup>220</sup> Solomon, Alan. 2000. "Land of Lincoln." *Chicago Tribune*, August 20.

## 5.2 Method Application

### 5.2.1 Findings

#### 5.2.1.1 Nation-Level Findings

Below, I compare the national networks. Figure 5—2 shows the visualized network of weighted rail shipments in 2007 and 2014, not taking rebilled shipments into account. Table 5—1 provides basic network-level statistics.

Figure 5—2: 2007 (top) and 2014 (bottom) weighted rail shipments to BEAs. Data Source: 2007 and 2014 PUWS. Analyzed in GEPHI.

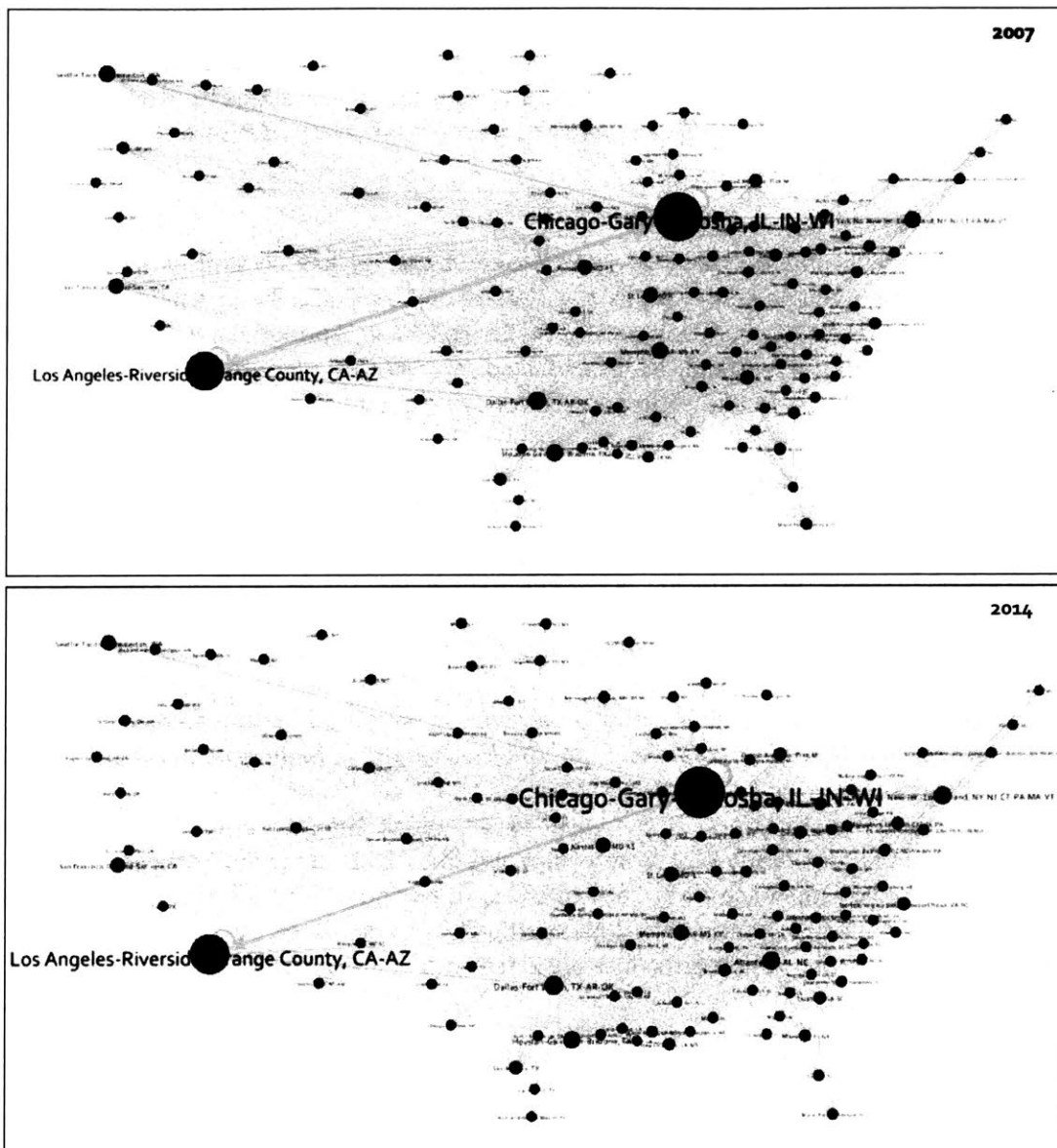




Table 5—1: Nation-level network statistics. Calculated by GEPHI.

Network Statistics	2007	2014
<b># Nodes</b>	140	140
<b># Edges (Cleaned) (NOT weighted)</b>	4,123	3,946
<b>Average Weighted Degree</b>	90,835	87,838
<b>Network Diameter</b>	4	4
<b>Graph Density</b>	0.212	0.203

While the visualization is purely illustrative, the network statistics reflect that the change in the national-level rail shipment network from 2007 to 2014. First, the average weighted degree decreased slightly from 2007 to 2014, which suggests that the sum of incoming and outgoing shipments has decreased. Second, the graph density has decreased slightly, which suggests that there are fewer connections between BEAs in 2014 than 2007. (Connections from every BEA to every other BEA would suggest a graph density of 1.<sup>221</sup>)

#### 5.2.1.2 State-Level Findings

Eleven BEAs span the Illinois border, but one (Peoria-Pekin, IL) has no entries in the PUWS. The remaining ten include Chicago-Gary-Kenosha, IL-IN-WI; Indianapolis, IN-IL; Champaign-Urbana, IL; Evansville-Henderson, IN-KY-IL; Paducah, KY-IL; St. Louis, MO-IL; Springfield, IL-MO; Des Moines, IA-IL-MO; Davenport-Moline-Rock-Island, IA-IL; and Madison, WI-IA-IL. Figure 5—3 visualizes the BEAs entering the Champaign-Urbana BEA. There are fewer apparent edges in 2014 than 2007, especially to the north and west.

Out of the Illinois-spanning BEAs, Chicago-Gary-Kenosha maintains the highest weighted degree in both 2007 and 2014, and its weighted out-degree is higher than its weighted in-degree in both years, which means that Chicago-Gary-Kenosha sends out more shipments by rail than it receives (Table 5—2). In fact, Chicago-Gary-Kenosha reports the highest weighted degree in the country in 2007 and 2014, followed in both years by Los Angeles-Riverside-Orange County, CA-AZ.

Most (six) of the Illinois-spanning BEAs show a decrease in weighted degree from 2007 to 2014. The only ones showing an increase are Paducah, Springfield, Davenport-Moline-Rock Island, and Madison. For Champaign-Urbana, in which Decatur and Macon County are found, weighted out-degree exceeds weighted in-degree for both years. This makes sense, given the “generation” of shipments that happens in the Champaign-Urbana BEA from companies like ADM. However, both weighted in-degree and weighted out-degree decrease from 2007 to 2014, reflecting a drop-off in weighted degree from 2007 to 2014. This finding suggests that Champaign-Urbana tends to be an “origin” more than a “destination,” but both the shipments intended for and coming from Champaign-Urbana have decreased from 2007 to 2014.

<sup>221</sup> As described in GEPHI for the description for graph density.



Figure 5—3: 2007 (top) and 2014 (bottom) shipments into (blue) and out of (red) the Champaign-Urbana BEA. Data Source: 2007 and 2014 PUWS. Analyzed in GEPHI. Please note that the largest dot corresponds to Chicago, not Champaign-Urbana. Champaign-Urbana is the smaller dot.

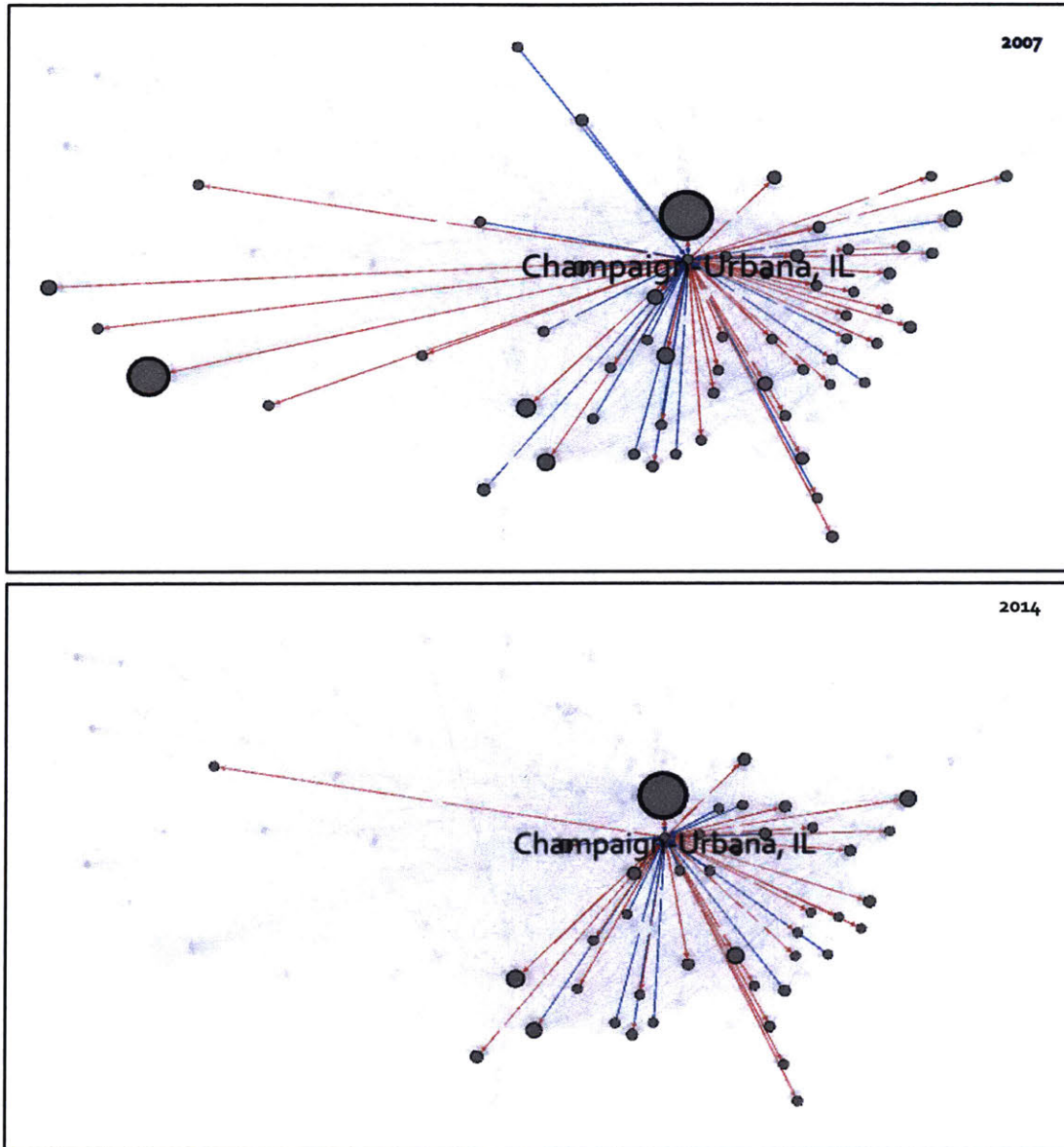


Table 5—2: Illinois-level node statistics. Calculated by GEPHI.

Business Economic Area (BEA)	Shipments In		Shipments Out		Sum of Shipments In and Out	
	Weighted In-Degree		Weighted Out-Degree		Weighted Degree	
	2007	2014	2007	2014	2007	2014
Chicago-Gary-Kenosha, IL-IN-WI	2,998,085	2,909,642	3,049,404	3,071,650	6,047,489	5,981,292
Indianapolis, IN-IL	42,435	21,742	31,335	12,242	73,770	33,984
Champaign-Urbana, IL	8,623	5,021	34,433	12,698	43,056	17,719
Evansville-Henderson, IN-KY-IL	30,247	4,669	21,256	6,010	51,503	10,679
Paducah, KY-IL	3,248	5,104	950	8,384	4,198	13,488
St. Louis, MO-IL	380,219	303,045	370,833	303,259	751,052	606,304
Springfield, IL-MO	831	1,040	141	174	972	1,214
Des Moines, IA-IL-MO	11,889	9,474	62,753	43,754	74,642	53,228
Davenport-Moline-Rock Island, IA-IL	18,087	10,100	3,422	14,044	21,509	24,144
Madison, WI-IA-IL	1,548	2,056	953	10,448	2,501	12,504

### 5.3 Summary

While there are limitations to using PUWS, these findings suggest that rail shipments have decreased from 2007 to 2014, nationally and at the state level. Chicago dominates the national and Illinois-level rail movements. The Champaign-Urbana BEA tends to be an origin more than a destination, which reflects the region's historic focus on exports.

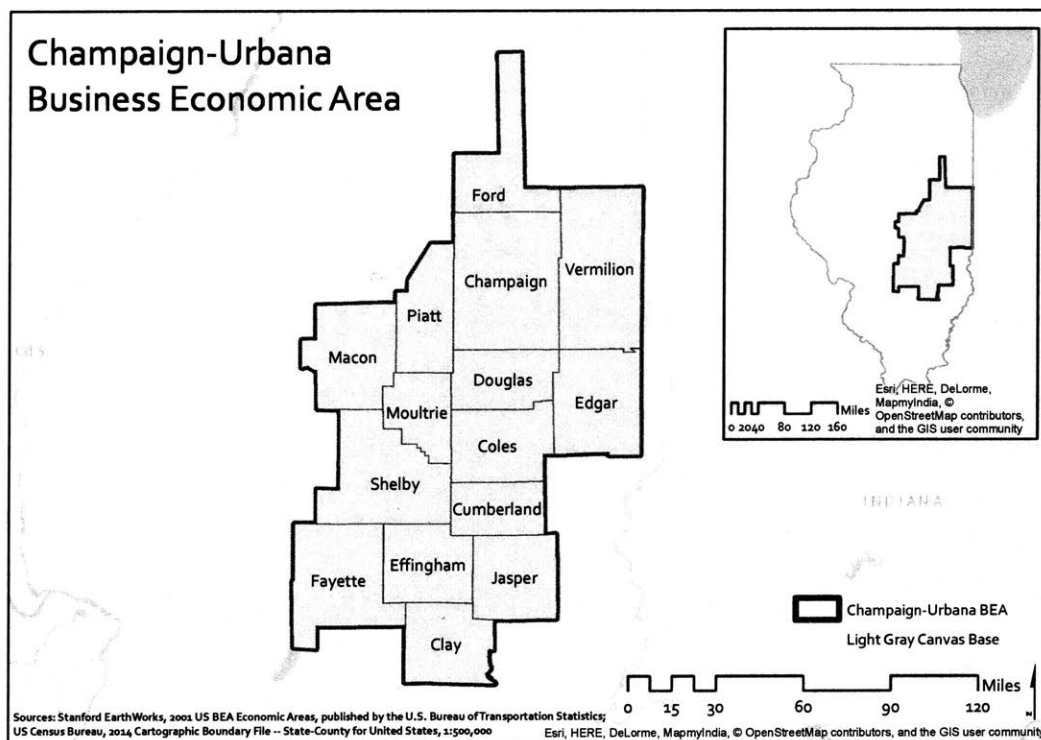
## 6 Regional Analysis

"...The central story of the nineteenth-century West is that of an expanding metropolitan economy creating ever more elaborate linkages between city and country."<sup>222</sup>

### 6.1 Overview

To understand the impact at the regional level, utilizing the Champaign-Urbana BEA as a proxy, I conduct three employment-related analyses: shift-share analysis, earnings analysis, and firm analysis. In this section, I aim to answer the following questions: *How have jobs, earnings, and young firms changed by two-digit NAICS industry code in the Champaign-Urbana BEA from 2007 to 2014?* Figure 6—1 shows the counties and locations, as well as their location relative to the rest of the state.

Figure 6—1: Champaign-Urbana BEA.



### 6.2 Method Application

#### 6.2.1 Shift-Share Analysis

I conduct a shift-share analysis to compare each county of the Champaign-Urbana BEA counties with the state of Illinois. I utilize County Business Patterns data from the US Census. A demographic snapshot of these fifteen counties is available in Table 9—4 in 9.2.

<sup>222</sup> Cronon, William. 1991. *Nature's Metropolis*. New York: W. W. Norton & Company, Inc, p. xv.

6.2.1.1 Findings

Out of the fifteen analyzed counties, only five (Cumberland, Edgar, Effingham, Ford, and Moultrie) report an increase in total employment from 2007 to 2014.<sup>223</sup> The biggest job gains were in Effingham (4,586) and Cumberland (609). Figure 6—2 shows the overall change in jobs by county, as well as the change for *Transportation and warehousing* and *Manufacturing*. The biggest job losses were in Champaign (-3,703) and Vermilion (-2,220). In total, the fifteen counties experienced a net loss of 5,891 jobs. The biggest losses were in *Manufacturing* (-6,262) and *Administrative and support and waste management and remediation* (-2,425). Most of the job losses in *Manufacturing* came from Champaign (-2,330), Coles (-900), and Macon (-866). Most of the job losses in *Administrative ...* came from Macon (-849), Coles (-516), and Champaign (-439). A summary for the region, by industry, is shown in Figure 6—3.<sup>224</sup>

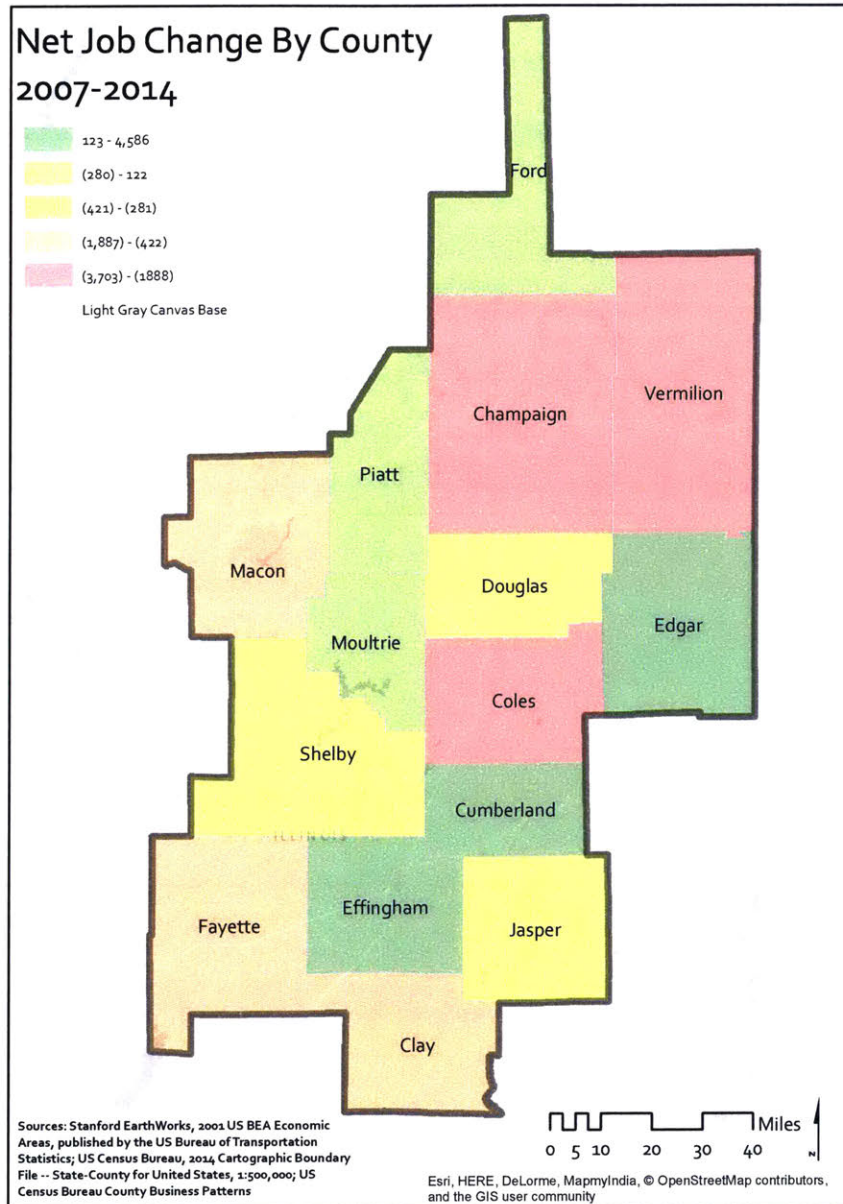
Figure 6—2: Shift-share summary for the region. Data Source: 2007 and 2014 US Census Bureau County Business Patterns. Please note that *Agriculture, forestry, fishing and hunting* was excluded due to limited data.



<sup>223</sup> See 9.2.1 in the Appendix.

<sup>224</sup> See 9.2.1 in the Appendix for the net change for *Manufacturing* and *Transportation and Warehousing*.

Figure 6—3: Net job change by county. Categories by quantile. Data Source: 2007 and 2014 US Census Bureau County Business Patterns.





## 6.2.2 Earnings Analysis

All dollar values are reported in 2017 dollars.<sup>225</sup>

### 6.2.2.1 Findings

First, I compute the share of full-time employment by (approximate) two-digit NAICS industry using the Bureau of Labor Statistics Characteristics of the Employed, Table 21 (Table 6—1). By inspection, I utilized a threshold of 80% of workers that are full-time (for both years) to delineate **predominantly full-time** industries. Using this threshold, I exclude *Wholesale and Retail Trade, Education and health services, Leisure and hospitality, and Other services*. I include *Mining, Construction, Manufacturing, Transportation and utilities, Information, Financial activities, Professional and business services, and Public administration*.

Table 6—1: Summary of industries that are predominantly full-time for 2007 and 2014. Data Source: 2007 and 2014 Bureau of Labor Statistics' Characteristics of the Employed, Table 21, Household Data Annual Averages. Industries shaded gray do not have a high percentage (>80%) of full-time workers for both 2007 and 2014.

Industry	Approximate NAICS Code (2012)	Percentage of Workers that are Full-Time, 2007	Percentage of Workers that are Full-Time, 2014
Mining	21	92%	93%
Construction	23	84%	83%
Manufacturing	31-33	90%	89%
Wholesale and retail trade	42, 44-45	73%	70%
Transportation and utilities	48-49	85%	84%
Information	51	82%	82%
Financial activities	52	83%	84%
Professional and business services	54	81%	81%
Education and health services	61-62	73%	73%
Leisure and hospitality		60%	56%
Other services		69%	67%
Public administration		85%	84%

Second, I compute the annual average earnings for each predominantly full-time industry for 2007 and 2014, in 2017 dollars (Table 6—2).<sup>226</sup> (This data was acquired in the form of monthly earnings, which I converted to annual earnings.) I excluded *Mining, quarrying, and oil and gas extraction, and Utilities* as there was data missing in several counties. All industries reflect at least a \$1,000 increase from 2007 to 2014 – *Finance and insurance* shows the biggest increase of \$5,237, though *Information* shows the largest percentage increase – except for *Construction*, which shows a decrease of over \$600, or 2%, from 2007 wages.

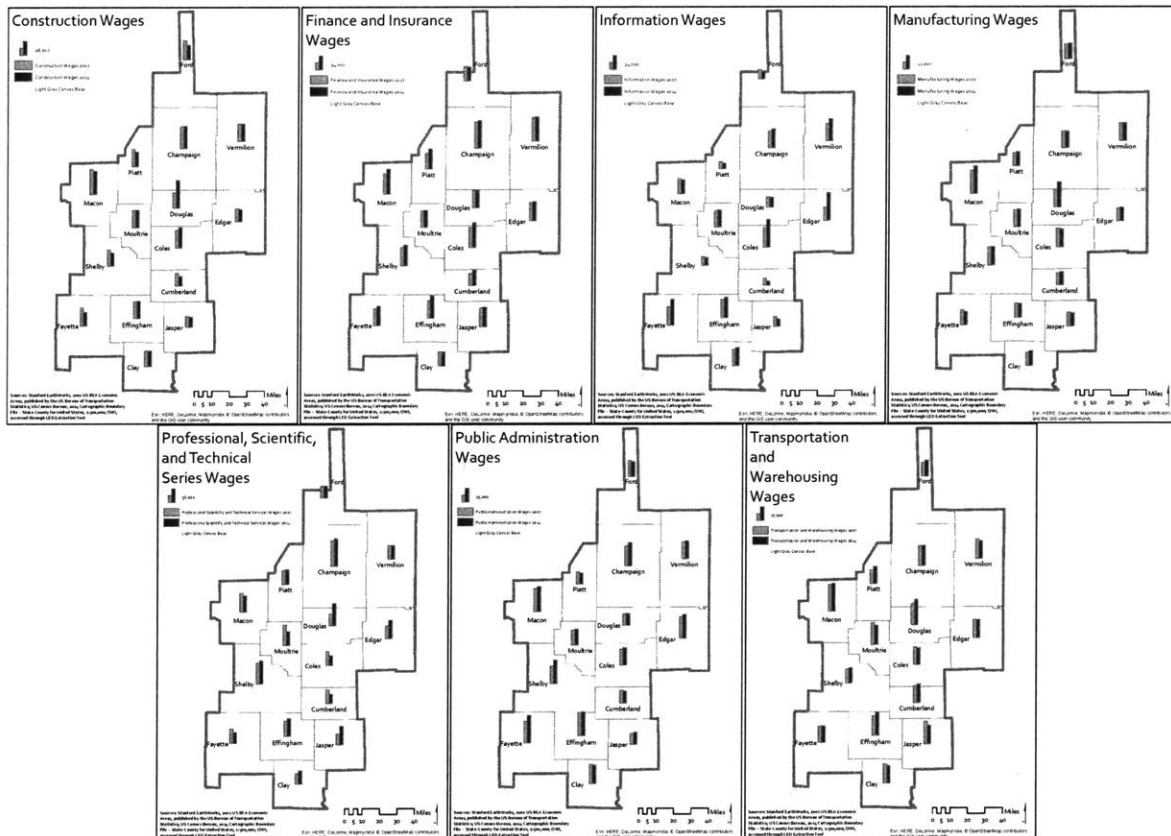
<sup>225</sup> See "CPI Inflation Calculator." 2017. *Bureau of Labor Statistics*. [https://www.bls.gov/data/inflation\\_calculator.htm](https://www.bls.gov/data/inflation_calculator.htm). \$1 in 2007 equals \$1.17 in 2017 dollars, and \$1 in 2014 equals \$1.03 in 2017 dollars.

<sup>226</sup> Please note that the industries from BLS and QWI do not line up exactly. To bridge them, I separated several industries.

Table 6—2: Annual average earnings by industry (averaged across the 15 counties, not including the state of Illinois). Source: 2007 and 2014 QWI, accessed through LED Extraction Tool. Please note that these figures are not weighted by county population or employment by industry.

Industry	2007 Q1 Average Earnings	2014 Q1 Average Earnings	Absolute Difference	Relative Difference
Construction	\$34,527	\$33,841	\$(686)	-2%
Finance and Insurance	\$43,929	\$49,166	\$5,237	+12%
Information	\$32,799	\$38,115	\$5,316	+16%
Manufacturing	\$46,822	\$50,055	\$3,233	+7%
Professional, Scientific, and Technical Services	\$41,205	\$43,918	\$2,713	+7%
Public Administration	\$35,634	\$38,723	\$3,088	+9%
Transportation and Warehousing	\$36,775	\$37,793	\$1,018	+3%

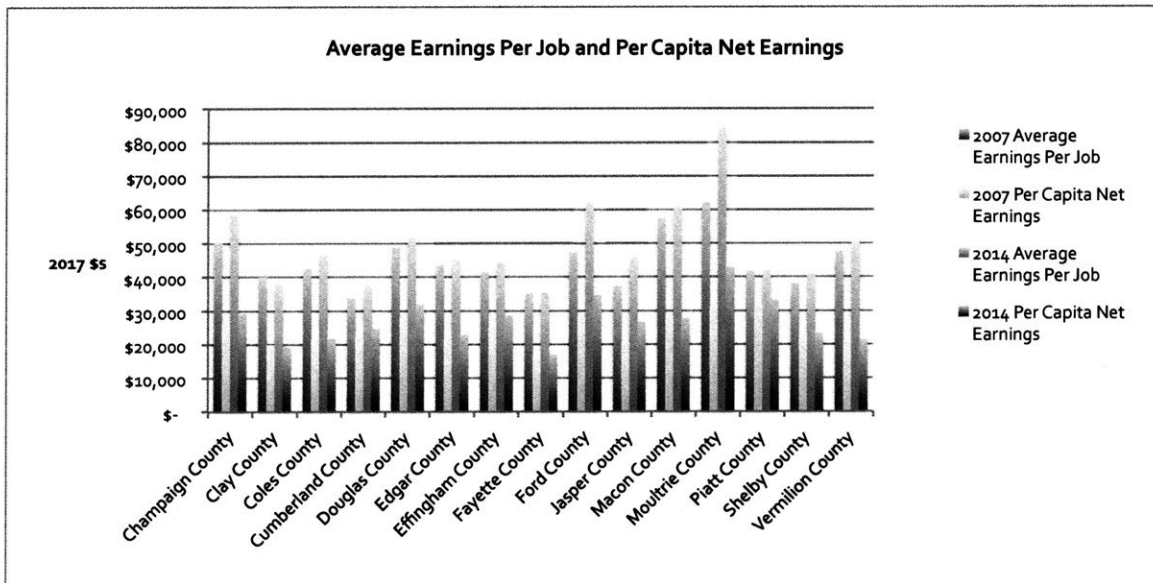
Figure 6—4: Annual average earnings by industry and year.



Then, I compare the findings by industry and by county (Figure 6—4). As shown in Figure 6—4,<sup>227</sup> for *Construction*, many counties, including Macon, as well as the state, show a decrease in earnings from 2007 to 2014. Douglas shows a large increase. In *Finance and insurance*, there are slight increases across the board, except in Ford and Clay, from 2007 wages to 2014 earnings. In *Information*, Edgar, Coles, and Fayette show large increases from 2007 to 2014. In *Manufacturing*, Macon reports the highest annual average earnings in both years. Douglas, Macon, and the state show an increase in earnings from 2007 to 2014. In *Professional, Scientific, and Technical Services*, Douglas shows a notable increase. In *Public Administration*, Fayette and Shelby show increases. In *Transportation and Warehousing*, there are small increases across the board, though the state shows a drop-off in earnings from 2007 to 2014. Next, I compare Macon’s earnings by industry. In 2007, Macon reports the highest average annual earnings (out of the 15 BEA counties) for *Construction*, *Manufacturing*, *Public administration*, and *Transportation and warehousing*. In 2014, Macon reports the highest average annual earnings for *Manufacturing* and *Transportation and warehousing*.

Third, I compare the resident per capita net earnings to the average earnings per job, using the “place of work” and “place of residence” distinction in the Bureau of Economic Analysis Economic Profile for Table CA30. The Bureau of Economic Analysis proxy for employment is “the number of jobs,”<sup>228</sup> which includes full- and part-time work.<sup>229</sup> In every case, the average earnings per job exceed the per capita net earnings. This is probably due to one of the limitations discussed – that certain segments of the population are not earning income, and thus reduce the per capita resident earnings. In most counties, the average earnings per job increase from 2007 to 2014 (Figure 6—5), but this is not true for Clay. All counties show a slight increase or stagnation between per capita net earnings from 2007 to 2014, but Clay and Macon show a slight decrease.

Figure 6—5: Resident income per capita versus average earnings. Data Source: Bureau of Economic Analysis, 2007 and 2014 Economic Profile, Table CA30.



<sup>227</sup> See 9.2.2 in the Appendix.

<sup>228</sup> “Local Area Personal Income Methodology.” 2016. Bureau of Economic Analysis. <https://www.bea.gov/regional/pdf/lapi2015.pdf>, p. VIII-1.

<sup>229</sup> “Local Area Personal Income Methodology.” 2016. Bureau of Economic Analysis. <https://www.bea.gov/regional/pdf/lapi2015.pdf>, p. VIII-2.



### 6.2.3 Firm Analysis

This analysis examines employment and job creation for private firms.

#### 6.2.3.1 Findings for employment by firm age and industry

In both 2007 and 2014, older firms (aged 4+ years) tend to employ the most people across industries (Figure 6—6). This pattern also holds for Macon County (Figure 6—7). In the Champaign-Urbana BEA, young firms employ the most people in *Accommodation and Food Services*, *Health Care and Social Assistance*, *Manufacturing*, and *Retail Trade*, and there are fewer people employed by young firms in *Manufacturing* in 2014 than in 2007. In Macon, there is growth in young firm employment in 2014 in *Health Care and Social Assistance* in 2014.

Figure 6—6: Private firm employment by industry (beginning of quarter estimate). Data Source: 2007 and 2014 QWI, accessed through the LED Extraction Tool.

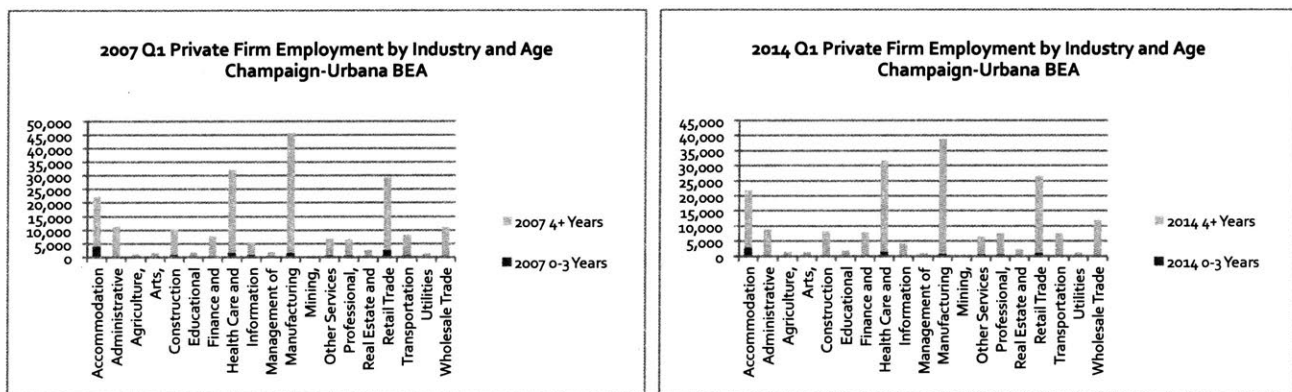
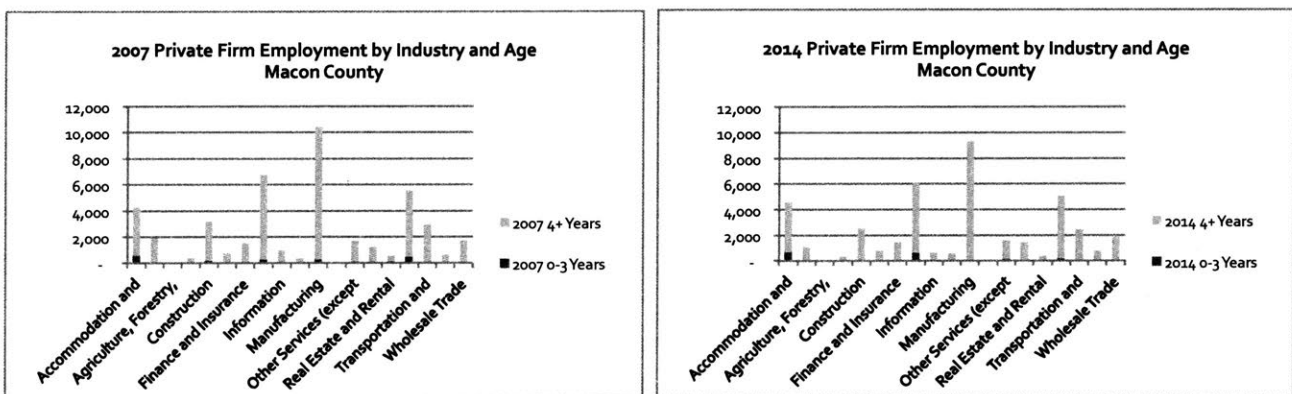


Figure 6—7: Private firm employment by firm age and industry for Macon County (beginning of quarter estimate). Source: 2007 and 2014 QWI, accessed through the LED Extraction Tool.



#### 6.2.3.2 Findings for job creation by firm age and industry

There were 1,134 jobs created in Macon County in the first quarter of 2014, as compared to 1,611 in the first quarter of 2007. There were 9,253 jobs created in the Champaign-Urbana BEA in the first quarter of 2014, as compared to 7,895 jobs created in the first quarter of 2007. Most jobs created in both 2007 and 2014 are by older firms – those that are at least four years old (Figure 6—8). In Champaign-Urbana BEA

and in Macon, young firms create the most jobs in *Accommodation and food services* in both 2007 and 2014 (Figure 6—8 and Figure 6—9). (In Macon in 2007, *Retail Trade* is tied with *Accommodation and food services* for young firms creating the most jobs.) In Macon in 2014, young firms are also creating jobs in *Construction* and *Health Care and Social Assistance*.

Figure 6—8: Job creation, 2007 and 2014. Data Source: 2007 and 2014, QWI, accessed through the LED Extraction Tool.

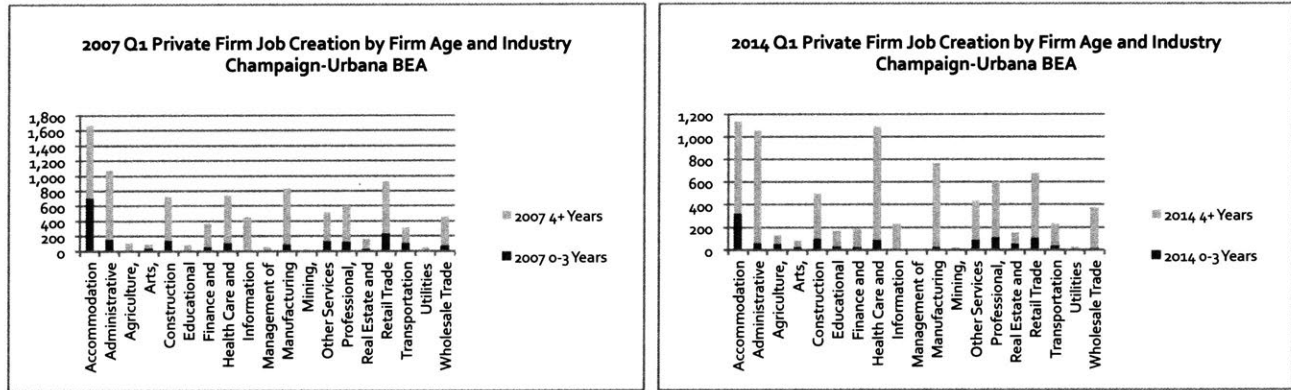
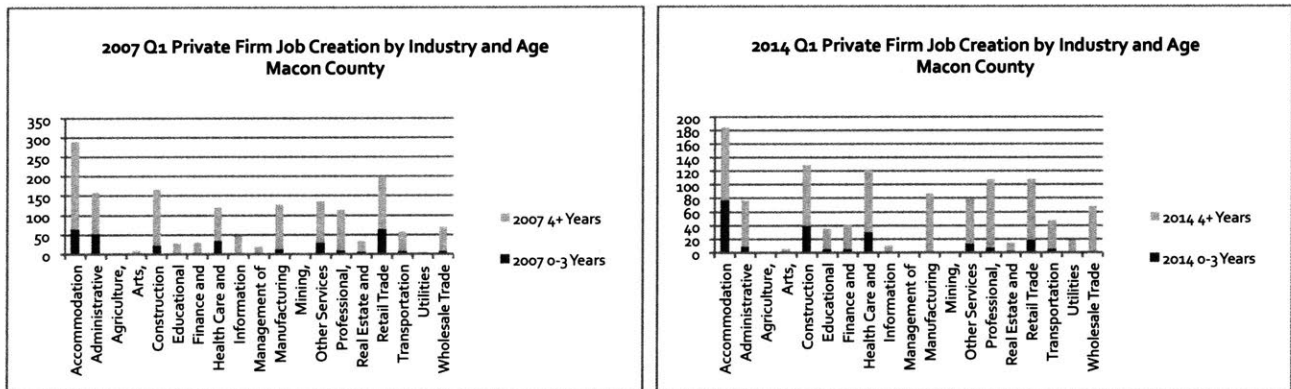


Figure 6—9: Job creation for Macon, 2007 and 2014. Data Source: 2007 and 2014, QWI, accessed through the LED Extraction Tool.



### 6.3 Summary

At the regional level, we see that there have been massive job losses, especially in *Manufacturing*. The only industry that showed a decrease in wages was *Construction*. Macon, despite showing job loss in *Manufacturing*, reports the highest *Manufacturing* wages, likely due to the specialization of jobs. Older firms tend to employ more people, and most job creation in the region and in Macon happens at the hands of older firms. In the region, young firms create jobs in *Accommodation and food services* and *Retail trade*. Macon also shows young firms creating jobs in *Construction* in 2014.

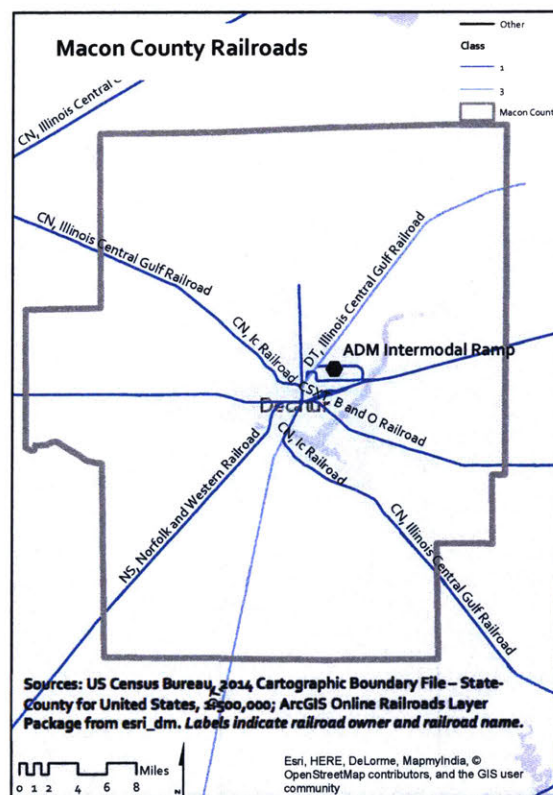
## 7 County-Level Analysis

"The Soybean Capital of the World"<sup>230</sup>

### 7.1 Overview

At the Macon County level, for 2007 and 2014, I examine local congestion, as experienced by a motorist, and the change in the geographic distribution of jobs for Macon County residents. In this section, I aim to answer: *How are train crossings distributed locally, how has congestion changed, and how might this affect local commutes?* Figure 7—1 shows the railroads in Macon County and their ownership. The ADM intermodal ramp is centrally located. Railroad crossings are already known as an issue for the county – as described by the Decatur City Manager in a 2016 *Herald & Review* article<sup>231</sup> – so I include them in the congestion analysis to provide a realistic estimate of drive times.

Figure 7—1: Macon County railroads, owners, and names.



<sup>230</sup> "Decatur, Illinois, United States." 2011. Encyclopaedia Britannica.

<sup>231</sup> Lusvardi, Chris. 2016. "Decatur Looking to Build on Midwest Inland Port Potential | Local | Herald-Review.com." *Herald & Review*. [http://herald-review.com/business/local/decatur-looking-to-build-on-midwest-inland-port-potential/article\\_76fafde3-b9f3-53c9-af74-efcoe442e127.html](http://herald-review.com/business/local/decatur-looking-to-build-on-midwest-inland-port-potential/article_76fafde3-b9f3-53c9-af74-efcoe442e127.html).

## 7.2 Method Application

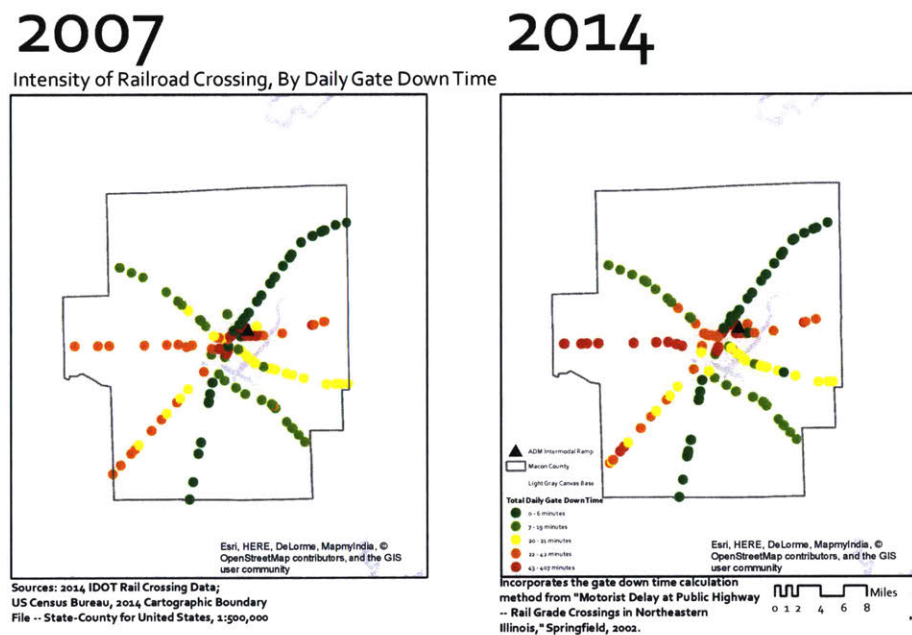
To determine the change in local congestion, I utilize a point-in-time analysis for 2007 and 2014 with Service Areas, a feature of Network Analyst in ArcGIS. This analysis does not include roadway traffic and congestion – only the potential delays caused by railroad crossings.

### 7.2.1 Local Congestion

#### 7.2.1.1 Findings

An investigation of the total freight gate down time reveals several things (Figure 7—2). The east-west line gate down time has worsened, as have a few other isolated crossings during the seven-year period. Some have improved (e.g., on the southeast line). It is to be expected that the rail lines show highly correlated gate down time, as (presumably) the same trains are traveling the same stretch of track at this degree of granularity.

Figure 7—2: 2007 and 2014, daily gate down time at Macon County railroad crossings.



I generate trimmed, detailed polygons in ArcGIS Network analysis to illustrate the drive sheds. The drive sheds for 2007 and 2014 from the centroid of Macon County are shown in Figure 7—3, which excludes the added cost of the railroad crossing delays, and Figure 7—4, which includes the added cost. There is no noticeable difference between the sheds in Figure 7—3. The drive shed areas in Figure 7—4, which include the added cost imposed by the at-grade rail crossings, also appear similar to the naked eye.

As expected, the added cost reduces the area that can be driven in a certain amount of time (Table 7—1). (Table 7—2 includes a "sanity check,"<sup>232</sup> in which I verify that there is no difference between the

<sup>232</sup> Thank you to Professor Arnold Barnett, who introduced me to this term in 1.203, Logistical and Transportation Planning Methods.

networks in 2007 and 2014 – the drive shed areas are the same.) Between 2007 and 2014, after taking into account the at-grade crossing delays, there is always a reduction in drive shed area. The percentage reductions are approximately the same in both 2007 and 2014 after factoring in the added cost (Table 7—1). This reduction is most significant in the 5-10 minute drive shed, which would be experienced in shorter trips from the centroid of Decatur. On the whole, the rail crossing delays are approximately the same in 2014 as in 2007, as shown in Table 7—1 (and, in fact, there is a very slight – but perhaps insignificant – increase in drive shed area from 2007 to 2014 for 5-10 and 10-15 minute drive sheds).

The findings suggest that the rail crossing delays have the biggest effect on motorists in the 0-5 minute drive time. Both 2007 and 2014 report a 4% reduction in drive shed area due to the added cost of the rail crossings. From 2007 to 2014, after taking into account the added cost at rail crossings, there is a slight reduction in drive shed area in the 0-5 minute drive time, and a slight increase in the drive shed area in the 5-10 and 10-15 minute drive times. (However, these may not be significant increases or decreases in area.)

There are limitations to this analysis, both in the calculation of the delay and in the rail crossing data. The 2014 data reports seven additional crossings, compared to the 2007 data. It is possible that some crossings are duplicated, and this would certainly intensify the drive shed reductions. As I mention in the methodology, I likely overestimate actual local congestion. Furthermore, by utilizing the centroid of Macon County, I focus on a point close to downtown Decatur, which may not be representative of the average resident's commute.



Figure 7—3: Drive sheds without the expected crossing delay.

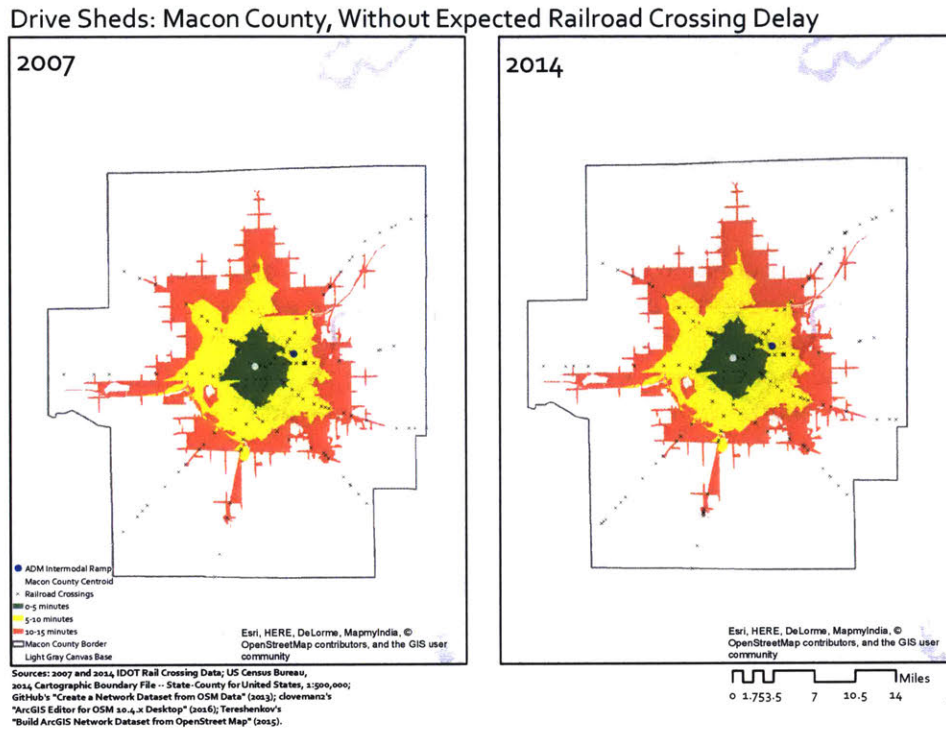


Figure 7—4: Drive sheds with the expected crossing delay.

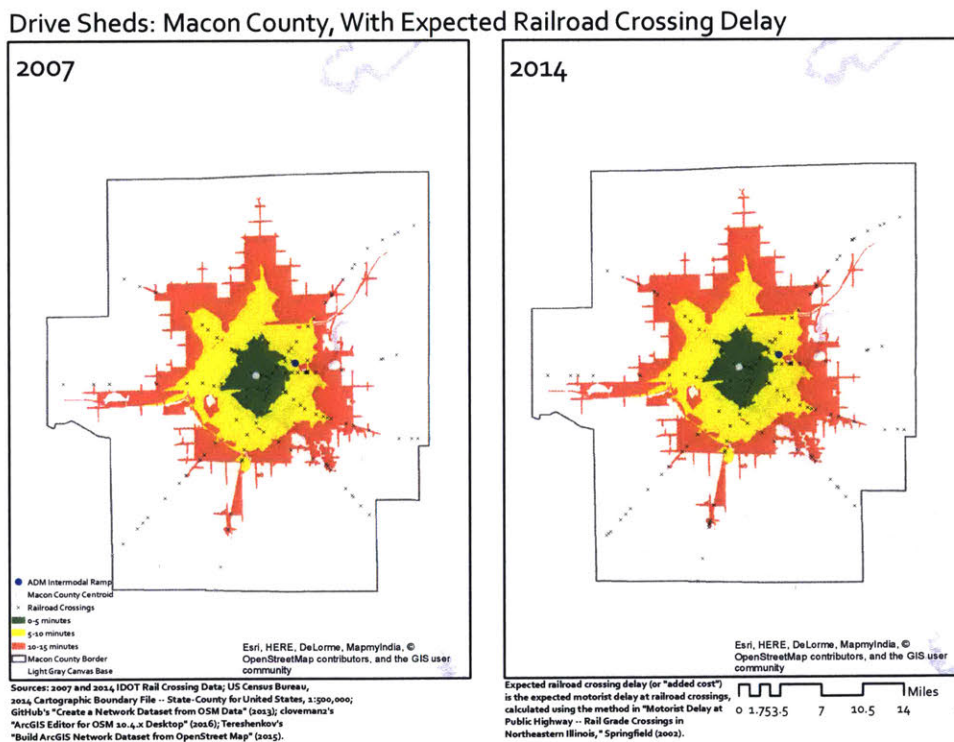


Table 7—1: Drive shed area comparison by cost, for 2007 and 2014.

Area (Acres)	2007			2014		
	Excluding Added Cost	Added Cost	Relative Change	Excluding Added Cost	Added Cost	Relative Change
5-minute drive shed	16,137.3	15,403.2	-4.6%	16,137.3	15,382.8	-4.7%
10-minute drive shed	60,703.3	57,997.5	-4.5%	60,703.3	58,009.4	-4.4%
15-minute drive shed	82,885.0	82,518.1	-0.44%	82,885.0	82,529.5	-0.43%

Table 7—2: Drive shed area comparison by year, with and without the added cost.

Area (Acres)	Including added cost			Excluding added cost		
	2007	2014	Relative Change	2007	2014	Relative Change
5-minute drive shed	15,403.2	15,382.8	-0.13%	16,137.3	16,137.3	0
10-minute drive shed	57,997.5	58,009.4	+0.02%	60,703.3	60,703.3	0
15-minute drive shed	82,518.1	82,529.5	+0.01%	82,885.0	82,885.0	0

## 7.2.2 Commute Pattern

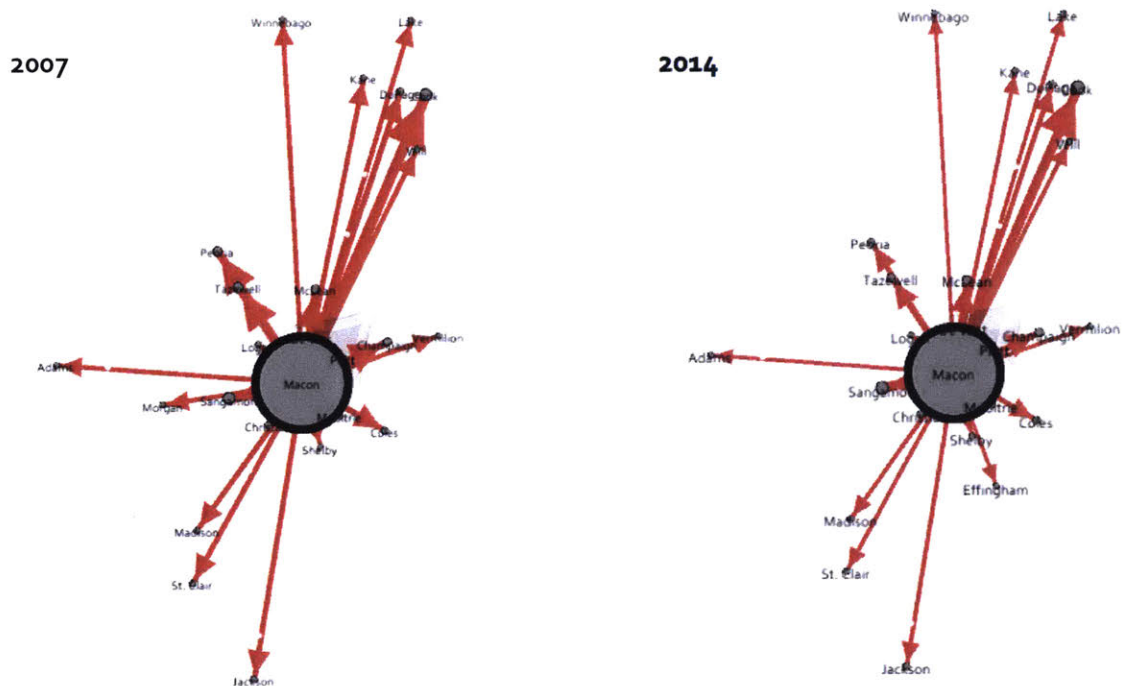
### 7.2.2.1 Findings

To contextualize the implications of local congestion, I also compare where Macon County residents work in 2007 versus 2014 (Figure 7—5), using LEHD data from OnTheMap.<sup>233</sup> In 2007, 31,193 residents work in Macon County, 2,066 work in Sangamon County, 1,964 work in Cook County, 1,303 work in Tazewell County, and 1,250 work in Peoria County. In 2014, 25,748 residents work in Macon County, 2,082 work in Cook County, 2,075 work in Sangamon County, 895 work in Champaign County, and 874 work in McLean County.<sup>234</sup> As a qualifier, this “commute” is not representative of home-work trips *each day*.<sup>234</sup> Instead, it represents places of residence and places of work.

<sup>233</sup> Data accessed from OnTheMap citing 2007 and 2014 LEHD Origin-Destination Employment Statistics.

<sup>234</sup> Moskowitz, Rachel, Ashley Leach, and Adam Garcia. “Accessing Employment Data for Counties and Smaller Geographies.” *Regional Review* 5, no. 2 (2015): 54, p. 30.

Figure 7—5: Top 25 places of work for Macon County residents in 2007 (left) and 2014 (right). Edge weight indicates number of commuters. Data Source: OnTheMap. Visualized in GEPHI.



### 7.3 Summary

The crossing analysis illustrates several findings. First, the gate down time is highly line-dependent, but the gate down time categories are large time intervals. There is a mix of improved and worsened crossings with gate down times. Second, the drive sheds analysis shows that the “added cost” imposed by the rail crossings is approximately the same in 2007 and 2014. The at-grade rail crossings affect the shorter drive times (0-5 minutes) more than the longer drive times. It is unclear, given the distribution of commuters to the west (Sangamon County) and northwest (Peoria and Tazewell Counties), whether commuters would have been affected by the at-grade crossings. Since most Macon County residents work in Macon County, it seems safe to assume that they were and are affected by at-grade crossings. However, the use of Macon County’s centroid may not be a realistic starting point for most commuters.



## 8 Discussion

*"Limitless Decatur"*

### 8.1 Review and Relevance

This thesis proposes a methodology for evaluating the impact of a "package" like MIP, which consists of infrastructure and economic development strategy. I implement this methodology on MIP. My findings suggest that in its (approximately) first year and a half of operation, MIP has had very little measurable impact. Rail shipments have decreased to and from the Champaign-Urbana BEA; the region has experienced a net job loss, with the biggest hits taken by manufacturing in Champaign, Coles, and Macon Counties; Macon and Coles Counties show a slight decrease in per capita net earnings from 2007 to 2014; Macon County shows the highest wages in *Manufacturing* and *Transportation and warehousing* in 2014; and Macon County has experienced jobs created by young (new) firms in Accommodation and food services and Construction; and locally, congestion has worsened due to rail crossing delays. That said, typically impact assessments are conducted after a facility has been operational for a few years,<sup>235</sup> and my analysis – examining the impact one year after the ramp opened – is likely too soon to make any definitive claims about its impact, especially given the likely lag times in the data used.

Given ADM's expectations, I cannot definitively say whether ADM hit its performance metrics. The fact that the drive sheds are approximately the same in 2007 and 2014, including the added cost imposed by the at-grade crossings, suggests that the intermodal ramp has not induced noticeable, community-affecting rail traffic. But because I did not incorporate road traffic data, I cannot say whether local drayage was reduced, as ADM suggested.

Like other recent economic impact assessment toolkits, this thesis presents a preliminary solution to the technical and financial barriers of economic impact assessment.<sup>236</sup> The Strategic Highway Research Program (SHRP 2) has produced Transportation Project Impact Case Studies (T-PICS), a tool that serves as a web-based repository for case studies on transportation infrastructure projects.<sup>237</sup> As described in a description of T-PICS, "Excellent economic impact assessment tools for highway capacity planning are available, but they tend to be relatively time-consuming and expensive to use."<sup>236</sup> Consequently, these limiting factors prevent planners from using them, which means that economic impact assessments are not conducted upfront.<sup>236</sup> The justification for the impact assessment methodology developed in this thesis is that it can be conducted with public data and at any point in time.

### 8.2 Discussion and Future Work

#### 8.2.1.1 *Tension between the public and private sectors*

Some characterize the relation between the public and private sectors in Illinois as "pay to play."<sup>238</sup> At its core, MIP raises the question of whether intermodal facilities, coupled with active local economic development measures, can improve a local area's economy. But indirectly, MIP is a vehicle for discussing and understanding the state of industrial relations in Illinois.

<sup>235</sup> Weisbrod, Glen. 2000. "NCHRP Synthesis 290: Current Practices for Assessing Economic Development Impacts from Transportation Investments." Washington, DC. [http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_syn\\_290.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_290.pdf), p. 2.

<sup>236</sup> "New Tool for Estimating Economic Impacts of Transportation Projects: Transportation Project Impact Case Studies (T-PICS)." 2012, p. 1.

<sup>237</sup> "New Tool for Estimating Economic Impacts of Transportation Projects: Transportation Project Impact Case Studies (T-PICS)." 2012, p. 2.

<sup>238</sup> Lucci, Michael. 2013. "ADM Relocates to Chicago – without State Tax Incentives." *Illinois Policy*. <https://www.illinoispolicy.org/adm-relocates-to-chicago-without-state-tax-incentives/>.

In approximately October 2013, ADM approached the state of Illinois, requesting \$20 million in state incentives.<sup>239</sup> This “request” was proffered with an ultimatum: concede to the incentives request, or the ADM headquarters move out of Illinois. However, ADM ultimately ended up taking its headquarters only to Chicago.<sup>240</sup> At the same time, ADM championed the local community in Decatur by guaranteeing financial support – alongside other local investment, ADM contributed \$250,000 yearly to the EDC for the three subsequent years.<sup>241</sup>

This request – one year after receiving the grant for the intermodal ramp – sparked interesting conversation about the state’s approach to its economy.<sup>242</sup> At approximately the same time as ADM’s incentives request, Office Depot and Office Max merged,<sup>243, 244, 245</sup> which jeopardized 1,600 suburban Chicago jobs (and ultimately, the jobs headed south to Florida).<sup>243</sup> In both cases – ADM and Office Max/Depot – these requests were successful but apparently drawn out in the Illinois Senate.<sup>246</sup>

#### 8.2.1.2 *Who Benefits – and Who Should Benefit?*

This thesis purposefully avoided a cost-benefit analysis, given the complex nature of determining and monetizing non-monetary costs and benefits. That said, a cursory review of the actors involved in or affected by MIP reveals that, most directly (and most obviously), ADM is probably the biggest beneficiary so far. Private actors in general, which include ADM as well as T/CCI, appear to demonstrate the biggest benefits, to date. The public sector contributed in the form of ADM’s grant from the state, which is small in comparison to the total project cost, and the facility receives advertising from the EDC. However, this advertisement and support is compensated by ADM. In 2014, ADM provided financial support for MIP in the form of a \$125,000 investment in a “strategic development plan.”<sup>247</sup> That said, it is too soon to tell if and how the public sector will benefit in the future.

Decatur residents are also bearing the brunt of infrastructural repair to their local road network. It seems likely that most of the wear-and-tear on the town’s road infrastructure comes from freight and/or industrial movement (albeit on major roadways, not local ones). However, Decatur’s fuel tax is \$0.04 per gallon higher for non-diesel gas than diesel – this suggests that passenger cars, which probably utilize non-diesel gas, pay more per mile than trucks and freight traffic (as through-traffic in Decatur), which probably utilize diesel.

#### 8.2.1.3 *All (Rail) Roads Lead to Chicago*

Throughout this study, I have encountered (and at one point, tried to answer) the question of whether this facility will help alleviate freight congestion in Chicago. This question is hugely important, and to my knowledge, no studies have investigated this (yet). If MIP does successfully reduce congestion in Chicago, this model could address two birds (state-level congestion and a weak local economy) with

<sup>239</sup> Erickson, Kurt. 2013. “ADM Wants \$20 Million in Sweeteners to Stay in Illinois.” *Herald & Review*, October 1.

<sup>240</sup> Lucci, Michael. 2013. “ADM Relocates to Chicago – without State Tax Incentives.” *Illinois Policy*. <https://www.illinoispolicy.org/adm-relocates-to-chicago-without-state-tax-incentives/>.

<sup>241</sup> Lusvardi, Chris. 2013. “ADM to Relocate Global Headquarters; Decatur Firmly in Future Plans.” *Herald & Review*, September 23.

<sup>242</sup> *Chicago Tribune*. 2013. “Editorial: Illinois Tax Incentives and the next ADM,” December 19. [http://articles.chicagotribune.com/2013-12-19/opinion/ct-illinois-tax-incentives-edit-1219-jm-20131219\\_1\\_tax-incentives-edge-credits-tax-breaks](http://articles.chicagotribune.com/2013-12-19/opinion/ct-illinois-tax-incentives-edit-1219-jm-20131219_1_tax-incentives-edge-credits-tax-breaks).

<sup>243</sup> Sweeney, Brigid. 2013. “Office Depot’s HQ Move Could Cost 1,600 Illinois Jobs.” *Crain’s Chicago Business*, December 10.

<http://www.chicagobusiness.com/article/20131210/NEWS07/131219978/office-depots-hq-move-could-cost-1-600-illinois-jobs>.

<sup>244</sup> Lucci, Michael. 2013. “ADM Relocates to Chicago – without State Tax Incentives.” *Illinois Policy*. <https://www.illinoispolicy.org/adm-relocates-to-chicago-without-state-tax-incentives/>.

<sup>245</sup> Erickson, Kurt. 2013. “Office Depot Leaving Illinois; Brady Seeks Special Session for ADM Deal.” *Herald & Review*, December 11.

<sup>246</sup> Associated Press. 2013. “Senate Panel Approves Tax Breaks for ADM.” *Will Radio.TV Online*, November 6; Sawyer, Gary. 2013. “House Should Act on ADM Incentives.” *Herald & Review*, December 14.

<sup>247</sup> Lusvardi, Chris. 2014. “ADM Donates \$2 Million to Affirm Commitment to Decatur.” *Herald & Review*, April 25.

one stone (infrastructure-economic development strategy package). That said, “solving” this problem would require additional knowledge of the rail industry, which is already extremely proprietary.

#### 8.2.1.4 *Improvements and Limitations*

Of course, there are many limitations to this analysis, and many ways in which its assumptions and processes can be improved. Further, the analyses conducted here are *examples* of how impact could be assessed – there are undeniably other analyses that may capture impact with greater accuracy.

First, this thesis utilizes publicly available data. However, many of the visualizations were done in ArcGIS, a geographic information systems (GIS) software that is not free. Future work should aim to incorporate free, open source GIS software.

Second, there are two places that should be studied in the future. The first is Decatur and Macon County, to see what the effect of MIP is, longer term. The second is places *like* Decatur. By this, I mean a town that fits the Decatur typology so that we could study whether the MIP model – infrastructure plus economic development – is transferrable in other contexts.

Third, there are numerous limitations to the conducted analyses. While there is value to examining the economy from a high-level, from the two-digit NAICS codes, as we do not yet know the scope of the economic impact of MIP, the analyses can certainly be improved. Examples of improvements include: focusing on intermodal container shipments at the national level; examining intermodal types of employment in the region alongside employment, generally; and introducing a more realistic distribution to model local train movements at the railroad crossings.

Finally, as mentioned, it is probably too soon to properly gauge the impact and affect of MIP. Furthermore, the data is likely skewed by bookending the financial crisis in 2008. This warrants future iterations of this analysis.

### 8.3 Concluding Remarks

At its surface, this thesis presents an impact study of the Midwest Inland Port in Decatur, Illinois. MIP is a privately owned public initiative. It developed out of a confluence of factors at several geographic scales. Locally, MIP was made possible by the existing freight infrastructure, the presence of an amenable corporate powerhouse, and a willing and eager community with local economic development advocates. At the state level, MIP emerged out of a complementary grant program and an undeniably freight-focused economy. To determine MIP’s impact, I draw upon graph theory to visualize the freight network and local passenger network; location theory to understand how firms place themselves on the network; and economic impact assessment to identify metrics for measuring the impact of MIP.

I analyze MIP at three scales: Macon County, where I examine the change in local street network congestion from 2007 to 2014 and the local commuting patterns; the Champaign-Urbana Business Economic Area, where I examine the change in employment, firms, and earnings by two-digit NAICS code from 2007-2014 in each of the fifteen member counties; and the state, where I examine the freight network illustratively and investigate how rail shipments have changed from 2007 to 2014 nationally and to the Illinois BEAs.

MIP is an undeniable benefit to central Illinois, as it improves freight connectivity and prepares the region for new firms and industries. Even if it does not live up to its high expectations, the downside is

small – and to ADM, there is no purported downside.<sup>247</sup> But, to the author’s knowledge, there has not been an evaluation of the investment, intermodal ramp, or MIP. The stakes for the community are unclear.

Decatur and Macon County may be on the brink of a massive renewal, and MIP could accelerate this change. This thesis claims that MIP’s impact would be multi-scale and could affect the state and region, as well as locality. Despite the challenges associated with conducting a CBA – understanding the actors at play, examining the costs and benefits exhaustively, and attributing monetary amounts to non-monetary costs and benefits, to name a few – CBA would reveal the “net benefit”<sup>248</sup> of this project across these expansive geographic scales. As Sassone and Schaffer (1978) describe, the process of determining the costs and benefits of a project is arguably the primary goal of CBA. This thesis attempts to enumerate the economic and transportation impacts of MIP as a precursor to the more-challenging task of determining the project’s costs and benefits. This impact assessment did not examine how the benefits and costs of MIP might accrue. But, this research raises the question of whether projects like MIP should only be pursued if the general public is *shown* to benefit. The private benefits of MIP seem to be proven – there is no downside to ADM, and other local companies like T/CCI have reduced costs – but public benefits (or costs) must wait to be seen.

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<sup>247</sup> Conversation, ADM representative, 9 January 2017.

<sup>248</sup> Sassone, P. G., and William A. Schaffer. 1978. *Cost-Benefit Analysis: A Handbook*. New York: Academic Press, Inc, p. 12.

## 9 Appendix

### 9.1 Facilitating Factors

#### 9.1.1 Decatur and Macon County

##### 9.1.1.1 Demographics

###### 9.1.1.1.1 Shrinking Cities

According to the Shrinking Cities Studio at Virginia Tech, a *shrinking city* no longer fills the city's original landscape due to a stark decrease in number of people and amount of employment.<sup>249</sup> Three texts that discuss shrinking cities are Brent Ryan's *Design After Decline: How America Rebuilds Shrinking Cities* (2012), Ross Gittell's *Renewing Cities* (1992), and Ed Glaeser's *Triumph of the City* (2011). Ryan describes shrinking cities on a spectrum: *moderate* shrinkage, which ranges from a 27-32% decrease in population, and *extreme* shrinkage, which ranges from a 47-59% decrease in population.<sup>250</sup> Gittell analyzes the towns of Lowell, Massachusetts; New Bedford, Massachusetts; Jamestown, New York; and McKeesport, Pennsylvania through case studies.<sup>251</sup> Glaeser alludes to the phenomenon of shrinkage in rust belt cities, though not necessarily by name, in *Triumph of the City* (2011). In his perspective, a "metamorphosis" transitions the economic base of a city from defunct to active; he cites the effectiveness of Boston and New York at tackling this transition.<sup>252</sup> Glaeser argues that the solution to a defunct economic base is grounded in "competition, connection, and human capital."<sup>252</sup>

###### 9.1.1.1.2 Macon County Demographic Shift

Table 9—1: A comparison of Macon County's demography from the US Census, from 1970 to 2010. Data Source: 1970 and 2010 US Census data, accessed through Social Explorer. Please note that the "Employment Status for Males and Females" came from the ACS 5-Year estimates from 2006-2010, as I could not find this data. Thus, we must interpret with caution.

Macon County, Illinois				
	1970		2010	
<b>Total Population</b>	125,010		110,768	
<b>Sex By Age</b>				
<b>Male:</b>	59,777	47.8%	52,950	47.8%
Age: Under 5	5,477	4.4%	3,470	3.1%
Age: 5 to 9	6,249	5.0%	3,504	3.2%
Age: 10 to 14	7,010	5.6%	3,439	3.1%
Age: 15 to 17	3,622	2.9%	2,340	2.1%
Age: 18 to 24	5,636	4.5%	4,944	4.5%
Age: 25 to 34	7,301	5.8%	6,224	5.6%
Age: 35 to 44	6,939	5.6%	6,233	5.6%
Age: 45 to 54	6,678	5.3%	7,892	7.1%
Age: 55 to 64	5,536	4.4%	7,279	6.6%
Age: 65 to 74	3,316	2.7%	4,209	3.8%
Age: 75 and over	2,013	1.6%	3,416	3.1%
<b>Female:</b>	65,233	52.2%	57,818	52.2%

<sup>249</sup> "What Are Shrinking Cities? | Shrinking Cities | Virginia Tech." 2009. [http://shrinkingcities.ncr.vt.edu/what\\_are\\_shrinking\\_cities.html](http://shrinkingcities.ncr.vt.edu/what_are_shrinking_cities.html).

<sup>250</sup> Ryan, Brent D. *Design After Decline: How America Rebuilds Shrinking Cities*. Philadelphia: University of Pennsylvania Press, 2012, p. 45.

<sup>251</sup> Gittell, Ross. 1992. *Renewing Cities*. Princeton: Princeton University Press.

<sup>252</sup> Glaeser, Ed. *Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier*. New York: Penguin Books, 2011, p. 43.

Age: Under 5	5,351	4.3%	3,466	3.1%
Age: 5 to 9	6,182	5.0%	3,372	3.0%
Age: 10 to 14	6,165	4.9%	3,531	3.2%
Age: 15 to 17	3,583	2.9%	2,162	2.0%
Age: 18 to 24	7,106	5.7%	5,408	4.9%
Age: 25 to 34	7,793	6.2%	6,764	6.1%
Age: 35 to 44	7,443	6.0%	6,562	5.9%
Age: 45 to 54	7,330	5.9%	8,405	7.6%
Age: 55 to 64	6,149	4.9%	7,631	6.9%
Age: 65 to 74	4,642	3.7%	4,870	4.4%
Age: 75 and over	3,489	2.8%	5,647	5.1%
<b>Race</b>				
White	114,968	92.0%	87,855	79.3%
Black	9,849	7.9%	18,027	16.3%
Some Other Race	193	0.2%	4,886	4.4%
<b>Employment Status for Male Population 16 Years and Older</b>				
Male 16 years and over:	39,743		41,861	
In labor force:	32,093	80.8%	27,776	66.4%
In Armed Forces:	82	0.2%	102	0.2%
In Civilian labor force:	32,011	80.6%	27,674	66.1%
Employed	31,000	78.0%	25,123	60.0%
Unemployed	1,011	2.5%	2,551	6.1%
Not in labor force	7,650	19.3%	14,085	33.7%
<b>Employment Status for Female Population 16 Years and Older</b>				
Female 16 years and over:	46,355		46,565	
In labor force:	19,680	42.5%	25,964	55.8%
In Armed Forces:	0	0%	19	0%
In Civilian labor force:	19,680	42.5%	25,945	55.7%
Employed	18,466	39.8%	24,057	51.7%
Unemployed	1,214	2.6%	1,888	4.1%
Not in labor force	26,675	57.6%	20,601	44.2%

## 9.1.1.1.3 Macon County Poverty

Table 9—2: Poverty rate over the last 12 months. Data Source: 2010-2014 ACS 5-year estimates, 2014, Table DP03. Please note that estimates for absolute values were not available.

Percentage of families and people whose income in the past 12 months is below the poverty level	Percent	Percent Margin of Error (MOE)
<b>All families</b>	13.1%	+/-1.2
With related children under 18 years	23.9%	+/-2.3
With related children under 5 years only	29.9%	+/-5.7
<b>Married couple families</b>	4.7%	+/-1.0
With related children under 18 years	8.5%	+/-2.0
With related children under 5 years only	9.2%	+/-5.5
<b>Families with female householder, no husband present</b>	42.5%	+/-4.4
With related children under 18 years	52.1%	+/-5.3
With related children under 5 years only	61.5%	+/-10.3
<b>All people</b>	18.1%	+/-1.2
Under 18 years	27.8%	+/-2.7
Related children under 18 years	27.6%	+/-2.7
Related children under 5 years	35.7%	+/-4.3
Related children 5 to 17 years	24.6%	+/-3.1
18 years and over	15.3%	+/-1.0
18 to 64 years	17.6%	+/-1.3
65 years and over	6.7%	+/-1.4
People in families	15.7%	+/-1.4
Unrelated individuals 15 years and over	27.1%	+/-1.7

## 9.1.1.2 Economic Base

Table 9—3: 2014 Location quotients. Data Source: US Census Bureau County Business Patterns. Please note that "adjusted" means that I took the midpoint of the reported range of number of employees.

2012 NAICS Code	Decatur, Paid employees (adjusted)	IL, Paid employees (adjusted)	US, Paid employees (adjusted)	% of Decatur	% of IL	% of US	LQ, State	LQ, US
Utilities	749.5	28,412	637,840	2%	1%	1%	3.04	3.08
Industries not classified	8	374.5	17,499.5	0%	0%	0%	2.46	1.20
Management of companies and enterprises	3,749.5	199,481	3,235,958	8%	4%	3%	2.16	3.04
Construction	2,960	182,749	5,705,146	6%	3%	5%	1.86	1.36
Manufacturing	7,130	544,488	11,424,251	15%	10%	9%	1.51	1.64
Transportation and warehousing	2,703	231,473	4,406,767	6%	4%	4%	1.34	1.61
Health care and social assistance	7,916	787,928	18,852,038	17%	15%	16%	1.16	1.10
Retail trade	5,672	605,655	15,372,632	12%	11%	13%	1.08	0.97
Accommodation and food services	4,523	498,190	12,791,928	10%	9%	11%	1.04	0.93
Other services (except public administration)	2,176	244,981	5,347,121	5%	5%	4%	1.02	1.07
Total for all sectors	46,164	5,312,290	121,069,944	100%	100%	100%	1.00	1.00
Educational services	1,393	164,407	3,562,364	3%	3%	3%	0.98	1.03
Arts, entertainment, and recreation	578	78,114	2,170,121	1%	1%	2%	0.85	0.70
Real estate and rental and leasing	479	76,466	2,021,372	1%	1%	2%	0.72	0.62
Finance and insurance	1,637	328,292	6,078,713	4%	6%	5%	0.57	0.71
Wholesale trade	1,513	314,398	5,966,747	3%	6%	5%	0.55	0.67
Information	539	124,909	3,364,530	1%	2%	3%	0.50	0.42
Administrative and support and waste management and remediation services	1,921	471,702	10,579,324	4%	9%	9%	0.47	0.48
Professional, scientific, and technical services	1,214	419,062	8,619,574	3%	8%	7%	0.33	0.37
Mining, quarrying, and oil and gas extraction	20	9,089	758,971	0%	0%	1%	0.25	0.07



## 9.1.2 State

Figure 9—1: Page 1 of FOIA response from IL DCEO.



**Illinois**  
**Department of Commerce**  
**& Economic Opportunity**  
 Bruce Rauner, Governor

April 21, 2017

**VIA ELECTRONIC MAIL**

Erin Kenney  
[Erin.Kenney@mit.edu](mailto:Erin.Kenney@mit.edu)

Re: Freedom of Information Act Request, #2017-0082

Dear Ms. Kenney:

The Department of Commerce and Economic Opportunity (the "Department") is in receipt of your Freedom of Information Act. (the "Act" or "FOIA"), 5 ILCS 140/1, et seq., dated April 18, 2017, request for:

- the grant agreement for Grant 13-202002
- any associated RFPs for the project undertaken with the grant's funding
- any tax credit agreements for Archer Daniels Midland ("ADM")

The records responsive to your request are attached. Additionally, the Department included the application and grant reporting records associated with Grant 13-202002. The Department has also included copies of certain tax credit certificates; however, the Department does not have a tax credit agreement with ADM, as the program under which ADM receives those credits does not utilize an agreement between the Department and the tax credit claimant.

Please be advised that certain information has been redacted in accordance with the FOIA exemptions at 5 ILCS 140/7(1)(b), and (g). These exemptions permit the Department to withhold portions of records to the extent they consist of as private information (in this case, signatures), unless disclosure is required by another provision of the Act, a state or federal law or a court order; and trade secrets and commercial or financial information furnished under a claim that they are proprietary, privileged, or confidential, and that disclosure of that information would cause competitive harm to the person or business.

Section 9(a) of the Act gives a requesting party the right to seek a review of the public body's response. The review is administered through the Attorney General's office by the Public Access Counselor (PAC). You, the requestor, have 60 calendar days to submit your request for review to the PAC. The request must be submitted in writing, either by electronic mail, by fax, or by the United States Postal Service and sent to:

Public Access Counselor

Email: [publicaccess@atg.state.il.us](mailto:publicaccess@atg.state.il.us)

Figure 9—2: Page 1 of ADM's grant request approval.



**Illinois  
Department of Commerce  
& Economic Opportunity**

Pat Quinn, Governor

November 19, 2012

Jim Bobitt  
Director of North American Rail Operations  
ARCHER DANIELS MIDLAND COMPANY  
4666 Faries Parkway  
Decatur, IL 62526-5630

Dear Mr. Bobitt,

The Department of Commerce and Economic Opportunity (DCEO) would like to welcome you to our community of grantees, and congratulate you on your grant award (13-202002). You are now an active participant in the process of working toward the accomplishment of the economic development goals of the State of Illinois, DCEO, and your own organization.

DCEO is the lead state agency responsible for improving Illinois' competitiveness in the global economy. Guided by an innovative regional approach, DCEO administers a wide range of economic and workforce development programs, services and initiatives designed to create and retain high quality jobs and build strong communities. DCEO leads the Illinois economic development process in partnership with businesses, local governments, workers and families.

This "Welcome Package" is intended to provide you with critical information about and requirements of your grant award. Your success in accomplishing the goals and objectives agreed to and stated in your grant agreement is our success in working toward DCEO's economic development mission for the State of Illinois. To assure your success and to provide accountability for the funds entrusted to DCEO, we will review your grant's progress toward the achievement of goals and will provide oversight of grant-related deliverables and expenditures. DCEO will make every effort to provide you with the information and assistance you need to reach your goals and to maintain compliance with your grant responsibilities. It is our hope that you will contact us when you have questions or concerns about complying with the requirements or terms and conditions of the grant agreement.

To facilitate ongoing communication and to provide you with an electronic means to submit your reports, grantees with Internet access are encouraged to use email to submit your reports, documentation and other correspondence. Additional general information is available at the DCEO Office of Accountability's website <http://www.ildceo.net/accountability> to assist you in the management and administration of your grant. Grantees without Internet access will need to use other traditional means of communication with their assigned grant manager.

Once again, we congratulate you on your grant award and look forward to working in partnership with you to achieve our economic development goals.

Sincerely,

Adam Pollet  
Acting Director

[www.ildceo.net](http://www.ildceo.net)

500 East Monroe  
Springfield, Illinois 62701-1643  
217/782-7500 • TTY: 800/785-6055

100 West Randolph Street, Suite 3-400  
Chicago, Illinois 60601-3219  
312/814-7179 • TTY: 800/785-6055

2309 West Main, Suite 118  
Marion, Illinois 62959-1180  
618/997-4394 • TTY: 800/785-6055

Figure 9—3: Page 1 of ADM's grant application.



03-16-12 P02:49 IN

Jeff,

Enclosed is the submittal form for the Emerging Technological Enterprises Grant.

We included the opinion of cost from our engineering firm for the intermodal ramp. I have also included some of the original e-mail that includes a summary of the project benefits and scope.

We are still working on the conveyor cost and justification, but the intermodal site has been submitted and approved. The grant money would be used to lay out site infrastructure to support the independent projects.

Please feel free to contact with and questions or concerns.

Regards,

Jim Bobitt  
ADM Transportation  
Director- North American Rail Operations

## 9.2 Region-Level Analysis

Table 9—4: Demographic overview of Champaign-Urbana BEA. Data Source: 2007 US Census Bureau ACS 3-year estimates and 2014 US Census Bureau ACS 5-year estimates, accessed through Social Explorer. Please note that "-" indicates that no data were available.

	Land Area (Square Miles, 2014)	Year	Population	% Male	% White Alone	% Black or African American Alone	% Asian Alone	% Two or More Races	% Unemployed (Out of Civilian Population in Labor Force 16 Years and Years and	% Under 18 Years	% 18-34 Years	% 35-64 Years	% 65 and Older
ILLINOIS	55,519	'07	12,783,049	49.2%	71.1%	14.8%	4.2%	1.5%	7.5%	25.1%	23.8%	39.1%	12.0%
		'14	12,868,747	49.1%	72.5%	14.4%	4.9%	2.2%	10.0%	23.8%	23.5%	39.5%	13.2%
Champaign	996	'07	188,474	50.7%	76.7%	11.5%	8.1%	2.0%	6.1%	20.2%	39.0%	31.0%	9.8%
		'14	204,214	49.9%	74.2%	12.5%	9.6%	2.8%	7.0%	19.3%	38.6%	31.7%	10.5%
Clay	468	'07	-	-	-	-	-	-	-	-	-	-	-
		'14	13,675	49.3%	97.7%	0.4%	0.1%	1.1%	7.4%	23.3%	18.7%	39.8%	18.2%
Coles	508	'07	51,157	48.3%	94.5%	3.0%	1.3%	0.6%	9.5%	18.6%	35.4%	32.3%	13.8%
		'14	53,655	48.1%	93.0%	3.6%	1.0%	2.0%	11.2%	18.1%	34.3%	33.1%	14.4%
Cumberland	346	'07	-	-	-	-	-	-	-	-	-	-	-
		'14	10,950	50.2%	97.7%	0.4%	1.0%	0.6%	8.8%	23.2%	18.9%	40.8%	17.1%
Douglas	417	'07	-	-	-	-	-	-	-	-	-	-	-
		'14	19,867	49.3%	96.0%	0.5%	1.2%	1.0%	6.0%	25.5%	20.0%	38.5%	16.0%
Edgar	623	'07	-	-	-	-	-	-	-	-	-	-	-
		'14	18,171	48.8%	98.2%	0.6%	0.4%	0.7%	11.3%	21.6%	18.6%	40.5%	19.3%
Effingham	479	'07	34,317	49.3%	97.8%	0.0%	0.6%	1.0%	3.1%	25.7%	21.8%	38.0%	14.6%
		'14	34,280	50.0%	97.6%	0.3%	0.3%	0.8%	6.1%	24.2%	21.0%	38.8%	16.0%
Fayette	716	'07	21,487	51.6%	-	-	-	-	6.6%	21.9%	24.4%	38.1%	15.6%
		'14	22,041	52.8%	95.8%	3.0%	0.2%	0.8%	11.1%	22.2%	21.6%	39.7%	16.5%
Ford	486	'07	-	-	-	-	-	-	-	-	-	-	-
		'14	13,906	49.6%	97.8%	0.5%	0.3%	1.1%	10.1%	23.3%	17.4%	40.0%	19.3%
Jasper	495	'07	-	-	-	-	-	-	-	-	-	-	-
		'14	9,658	49.9%	97.9%	0.2%	0.1%	0.8%	5.5%	22.3%	18.9%	41.3%	17.4%
Macon	581	'07	109,101	47.7%	81.8%	14.4%	0.9%	2.4%	6.4%	23.3%	22.0%	39.1%	15.7%
		'14	109,833	47.9%	79.0%	15.2%	1.2%	4.1%	11.9%	22.5%	21.1%	39.3%	17.0%
Moultrie	336	'07	-	-	-	-	-	-	-	-	-	-	-
		'14	14,896	48.7%	98.4%	0.3%	0.2%	0.9%	5.9%	24.5%	19.2%	38.0%	18.4%
Piatt	439	'07	-	-	-	-	-	-	-	-	-	-	-
		'14	16,552	49.6%	97.8%	0.3%	0.1%	1.8%	5.8%	23.0%	17.5%	42.1%	17.3%
Shelby	759	'07	21,907	49.8%	-	-	-	-	6.0%	22.2%	19.8%	39.4%	18.6%
		'14	22,216	49.9%	98.6%	0.4%	0.3%	0.4%	6.9%	21.8%	18.0%	40.5%	19.7%
Vermilion	898	'07	81,566	49.2%	83.9%	11.6%	0.6%	1.3%	10.2%	24.1%	22.1%	37.6%	16.2%
		'14	80,773	49.7%	82.8%	13.5%	0.8%	1.3%	11.9%	24.2%	20.0%	39.1%	16.7%

9.2.1 Shift-Share Analysis

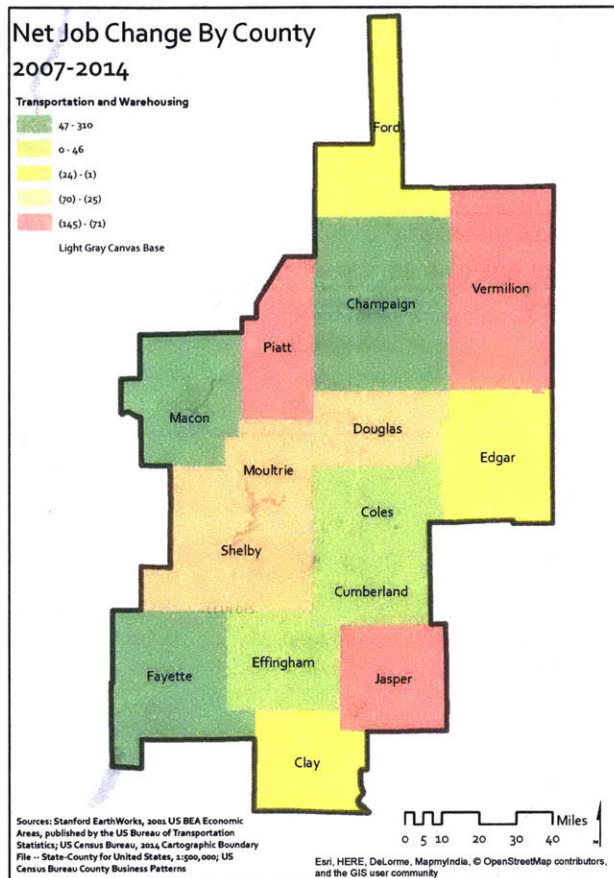
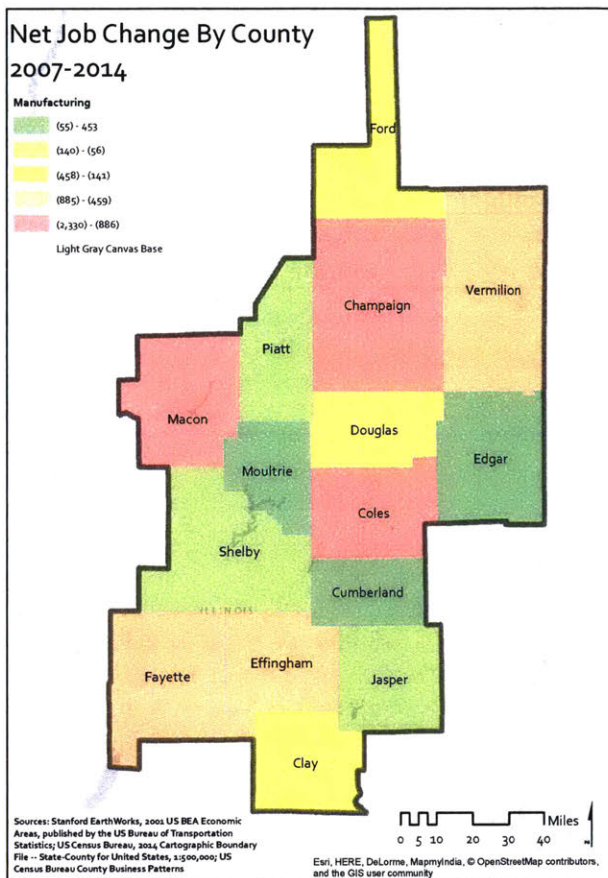
Table 9—5: Shift-share for Champaign-Urbana BEA counties. S=State Share, I=Industrial Mix, R=Regional Share. Gray indicates an error in calculating the value. Data Source: 2007 and 2014 US Census Bureau County Business Patterns.

Category of Shift		Champaign		Clay		Coles		Cumberland		Douglas		Edgar		Effingham	
		R	I	R	I	R	I	R	I	R	I	R	I	R	I
Mining, quarrying, and oil and gas extraction		-38	-33	-33	-33	-1	-3	-1	-3	-38	-2	-2	-2	-2	-1
Utilities		332	790	193	193	7	170	0	27	98	2	48	2	2	2
Construction		-805	1,374	-328	193	-515	229	-6	-55	68	-5	781	-3	235	-258
Manufacturing		696	197	24	24	28	229	-2	7	118	-4	11	3	134	59
Wholesale Trade		584	839	-60	-60	9	229	-3	-14	188	-18	168	-14	-50	241
Retail Trade		62	36	22	22	5	5	-1	1	-49	-4	-17	3	1	17
Transportation and Warehousing		596	58	-313	-313	46	13	0	0	-16	-1	3	-1	-28	4
Information		420	128	-96	-96	119	-33	-1	-3	-21	-4	-6	-4	13	-23
Finance and Insurance		769	188	61	140	0	-17	0	0	8	-1	-2	-1	48	-25
Real Estate and Rental and Leasing		544	251	13	140	1	40	0	1	-54	-2	126	3	-257	43
Professional, Scientific, and Technical Services		1,181	173	133	133	4	4	0	1	-43	-1	-1	0	5,345	18
Management of Companies and Enterprises		-505	127	546	546	56	56	-1	1	19	-1	113	-4	222	32
Administrative and Support and Waste Management and Remediation Services		131	179	33	33	13	13	0	2	106	-1	-9	10	15	7
Educational Services		4,944	1,507	102	102	513	513	-4	31	14	-5	-15	101	340	-41
Health Care and Social Assistance		211	69	-35	-35	12	12	0	1	-1	-1	-54	5	94	6
Arts, Entertainment, and Recreation		226	743	463	463	188	188	-2	8	55	-10	-28	27	-191	173
Accommodation and Food Services		278	142	-64	-64	-36	-36	-3	-8	-14	-4	-19	-9	291	-41
Other Industries (Except Public Administration)		-7	4	-4	-4	4	4	0	0	-4	0	0	0	0	0
Industries Not Classified		-	0	-1,576	-1,576	0	0	-23	0	-172	-109	375	0	4,883	0
Total Industries		-	2,548	-340	-340	0	0	-312	0	-172	-109	375	-91	4,883	-297

Vermilion		Shelby		Piatt		Moultrie		Macon		Jasper		Ford		Fayette		Category of Shift
S	I	R	S	I	R	S	I	R	S	I	R	S	I	R		
-1	-11	12	0	-2	2	0	0	12	0	-1	-4	0	-23	150	Mining, quarrying, and oil and gas extraction	
-3	7	-33	-1	2	-2	0	0	-19	-12	7	-6	0	1	37	Utilities	
-11	-171	47	-5	-88	-72	-4	-61	1,122	-657	-24	11	-3	-46	77	Construction	
-85	-766	334	-19	-169	50	-28	-254	404	-1162	-54	-9	-13	-138	-474	Manufacturing	
-32	108	148	-4	12	32	-2	6	153	70	7	-21	-5	20	-24	Wholesale Trade	
-57	-271	532	-7	-34	225	-8	-36	-111	485	-22	6	-9	-75	-22	Retail Trade	
-18	19	146	-1	1	-25	-3	3	307	41	3	-1	-2	3	200	Transportation and Warehousing	
-7	7	223	-1	1	0	-1	1	146	12	0	-61	-2	1	-18	Information	
-21	-63	-9	-4	-12	-54	-2	-6	226	-72	-4	46	-2	-10	29	Finance and Insurance	
-4	-28	-70	0	-3	36	0	-1	92	-52	-1	15	0	-3	33	Real Estate and Rental and Leasing	
-7	35	-50	-3	14	41	-2	9	259	108	2	30	-1	10	-8	Professional, Scientific, and Technical Services	
-12	78	-756	0	1	-1	0	0	-329	389	0	-5	-1	0	0	Management of Companies and Enterprises	
-21	44	-457	-6	13	340	-6	13	898	93	0	224	-1	2	53	Administrative and Support and Waste Management and Remediation Services	
-4	40	-88	0	2	-2	0	2	-91	225	-1	-2	0	0	0	Educational Services	
-78	656	-177	-11	91	-80	-12	103	-521	1,012	20	16	-16	134	-190	Health Care and Social Assistance	
-4	20	-39	-1	4	-37	-1	5	118	36	5	-4	0	2	-8	Arts, Entertainment, and Recreation	
-38	182	408	-6	27	-46	-3	13	386	350	8	6	-5	41	-55	Accommodation and Food Services	
-20	-54	-85	-4	-11	38	-2	-6	360	116	-5	2	-3	-15	-26	Other Industries (Except Public Administration)	
0	4	-4	0	4	14	0	4	-6	4	4	0	0	0	0	Industries Not Classified	
-423	0	-1,797	-71	0	-276	-77	0	-813	0	-28	188	-66	0	-551	Total Industries	



Figure 9—4: Net job change in *Manufacturing* (left) and *Transportation and Warehousing* (right). Categories by quantile. Data Source: 2007 and 2014 US Census Bureau County Business Patterns.





## 9.2.2 Earnings and Wage Analysis

Table 9—6: 2007 National full-time employment percentage by industry and class of worker. Data Source: Bureau of Labor Statistics, 2007 Characteristics of the Employed, Table 21, Household Data Annual Averages.

Industry and Class of Worker		Total at Work (Thousands)	Total Part-Time Workers (Working 1-34 Hours) (Thousands)	Total Full-Time Workers (Working 35+ Hours) (Thousands)	Full-Time Percentage
<b>Total, 16 years and over</b>		138,321	31,902	106,419	77%
<b>Total, wage and salary workers</b>		129,266	28,852	100,414	78%
Industry	<i>Approx. NAICS Code (2012)</i>				
Mining	21	685	52	633	92%
Construction	23	9,677	1,542	8,135	84%
Manufacturing	31-33	15,511	1,611	13,900	90%
Wholesale and retail trade	42, 44-45	19,219	5,135	14,084	73%
Transportation and utilities	48-49	6,967	1,068	5,899	85%
Information	51	3,325	606	2,719	82%
Financial activities	52	9,351	1,574	7,777	83%
Professional and business services	54	13,206	2,451	10,756	81%
Education and health services	61-62	27,703	7,539	20,164	73%
Leisure and hospitality		11,347	4,551	6,796	60%
Other services		5,755	1,771	3,985	69%
Public Administration		6,519	953	5,566	85%

Figure 9—5: 2014 National full-time employment percentage by industry and class of worker in non-agricultural industries. Data Source: Bureau of Labor Statistics, 2014 Characteristics of the Employed, Table 21, Household Data Annual Averages.

Industry and Class of Worker		Total at Work (Thousands)	Total Part-Time Workers (Working 1-34 Hours) (Thousands)	Total Full-Time Workers (Working 35+ Hours) (Thousands)	Full-Time Percentage
<b>Total, nonagricultural industries</b>		139,118	34,312	104,806	75%
<b>Total, wage and salary workers</b>		130,998	31,104	99,894	76%
Industry	<i>Approx. NAICS Code (2012)</i>				
Mining	21	1,026	70	957	93%
Construction	23	8,014	1,355	6,658	83%
Manufacturing	31-33	14,468	1,577	12,891	89%
Wholesale and retail trade	42, 44-45	18,888	5,668	13,219	70%
Transportation and utilities	48-49	6,968	1,102	5,866	84%
Information	51	2,905	534	2,371	82%
Financial activities	52	8,994	1,401	7,592	84%
Professional and business services	54	14,628	2,840	11,788	81%
Education and health services	61-62	30,124	8,041	22,082	73%
Leisure and hospitality		12,479	5,521	6,958	56%
Other services		5,958	1,959	3,998	67%
Public Administration		6,546	1,034	5,512	84%

Figure 9—6: Average annual earnings (stable jobs) by industry. 2017 dollars. Data Source: QWI, accessed through the LED Extraction Tool.

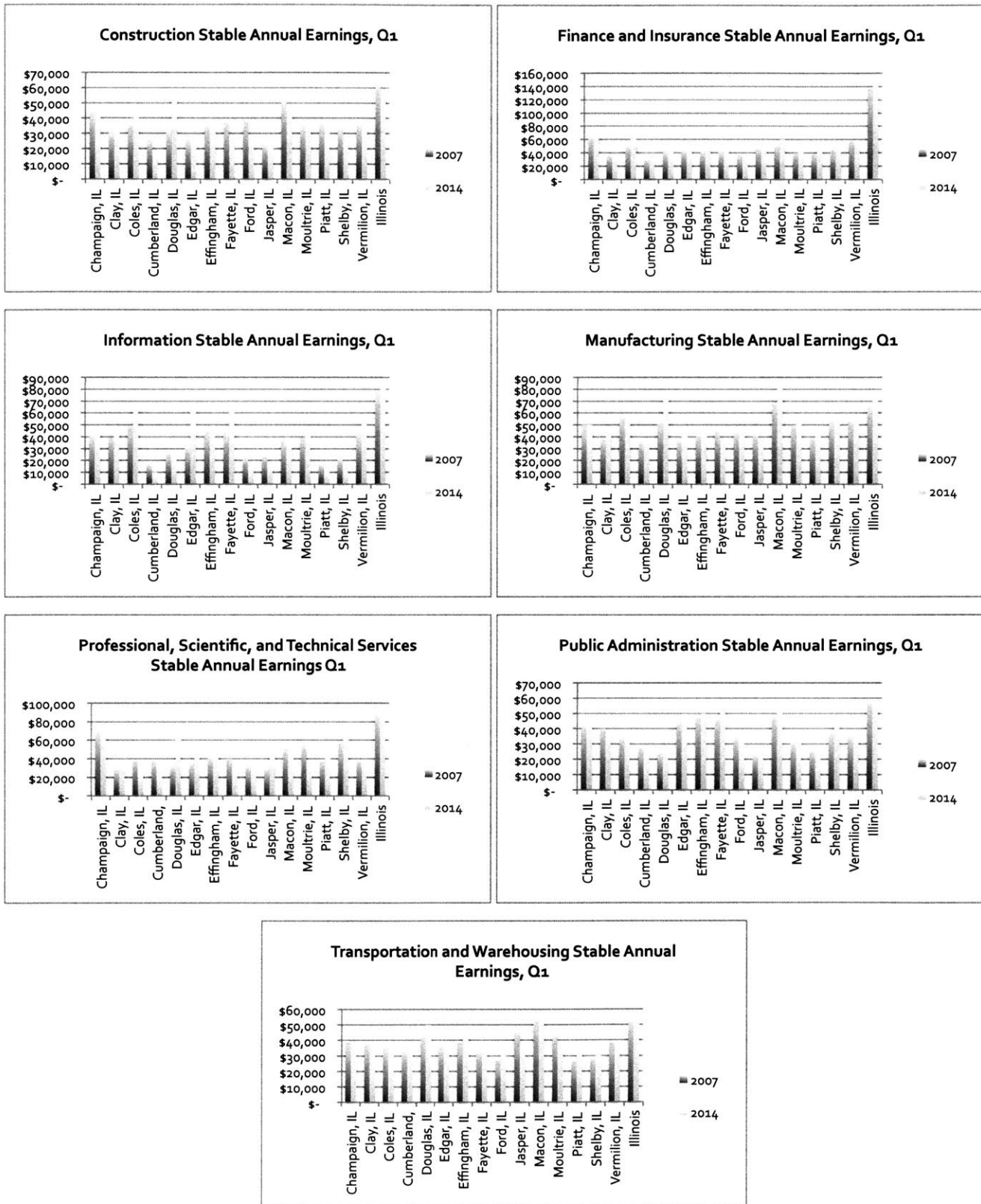


Figure 9—7: Ratio of earnings per job and per capita net earnings.

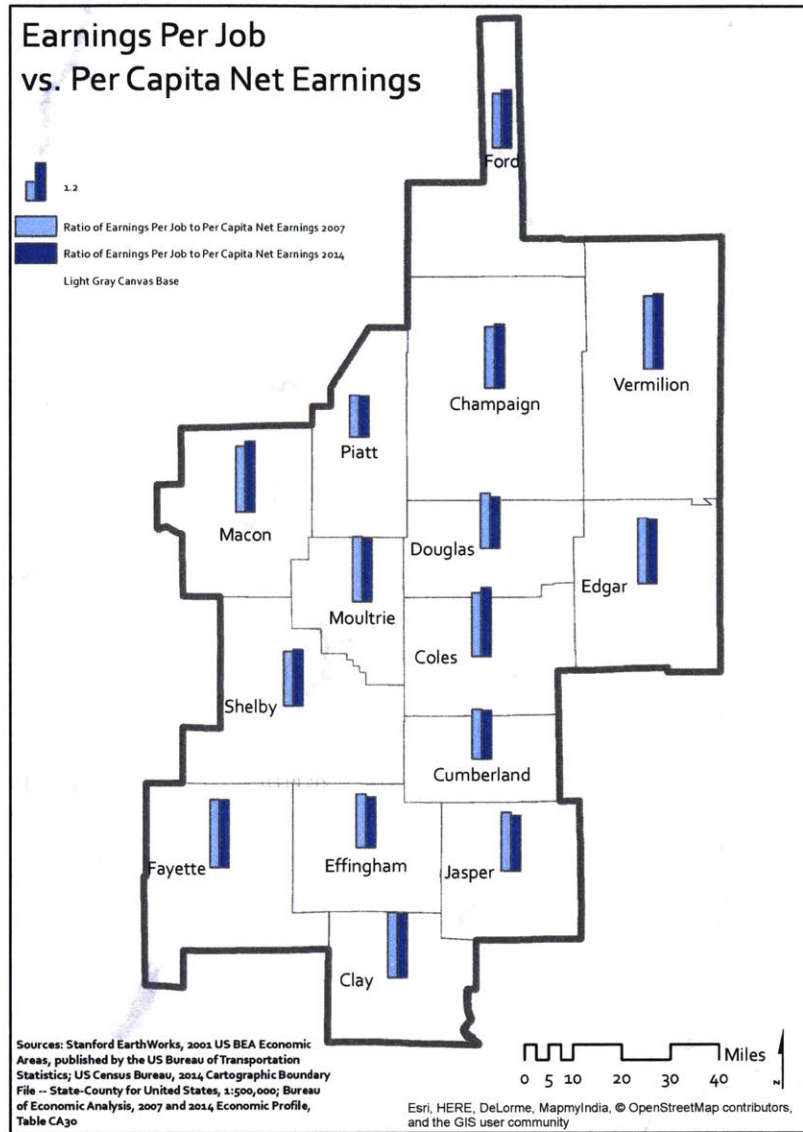


Table 9—7: Annual average earnings (stable jobs) for predominantly full-time industries in 2007. 2017 dollars. Data Source: QWI, accessed through the LED Extraction Tool.

	Construction	Financial activities <sup>253</sup>	Information	Manu- facturing	Mining	Pro- fessional and business services <sup>254</sup>	Public Admin- istration	Transportation <sup>255</sup>	Utilities
ILLINOIS	\$61,973	\$139,445	\$78,933	\$65,314	\$64,247	\$87,834	\$55,935	\$51,990	\$130,881
Champaign	\$44,802	\$63,419	\$40,927	\$49,968	\$65,721	\$69,891	\$41,615	\$38,680	\$64,724
Clay	\$31,127	\$34,903	\$39,438	\$37,922	\$48,227	\$28,375	\$40,197	\$37,627	\$67,083
Coles	\$35,746	\$49,070	\$48,466	\$55,795	\$64,893	\$38,301	\$33,275	\$34,889	\$70,116
Cumberland	\$26,100	\$29,512	\$16,343	\$35,156	\$-	\$37,290	\$26,999	\$33,078	\$-
Douglas	\$31,099	\$42,317	\$25,412	\$51,246	\$45,251	\$31,506	\$23,728	\$42,050	\$74,342
Edgar	\$26,409	\$44,086	\$30,958	\$37,023	\$-	\$34,314	\$44,633	\$35,942	\$53,773
Effingham	\$34,749	\$42,176	\$44,198	\$41,881	\$27,013	\$41,362	\$47,118	\$38,301	\$79,452
Fayette	\$36,855	\$41,081	\$44,296	\$44,282	\$33,893	\$39,958	\$45,574	\$32,166	\$49,224
Ford	\$38,680	\$36,462	\$22,506	\$44,184	\$14,489	\$31,829	\$33,261	\$26,887	\$92,018
Jasper	\$22,155	\$46,332	\$23,742	\$41,432	\$28,614	\$28,880	\$22,464	\$44,507	\$109,989
Macon	\$50,979	\$49,575	\$36,757	\$68,613	\$42,359	\$51,232	\$47,975	\$52,383	\$88,452
Moultrie	\$35,114	\$39,831	\$39,200	\$49,870	\$32,432	\$54,910	\$30,677	\$42,878	\$20,358
Piatt	\$35,718	\$37,978	\$16,511	\$38,329	\$-	\$37,332	\$25,370	\$26,353	\$6,416
Shelby	\$32,896	\$44,535	\$21,678	\$53,942	\$19,530	\$56,286	\$36,518	\$27,673	\$80,463
Vermilion	\$35,479	\$57,662	\$41,558	\$52,678	\$75,535	\$36,602	\$35,114	\$38,217	\$70,748

<sup>253</sup> Interpreted as *Finance and Insurance* from QWI<sup>254</sup> Interpreted as *Professional, Business, and Technical Services* from QWI<sup>255</sup> Note: I split *Transportation and Utilities* into two separate categories. This category includes *Transportation and Warehousing* from QWI

Table 9—8: Annual average earnings (stable jobs) for predominantly full-time industries in 2014. 2017 dollars. Data Source: QWI, accessed through the LED Extraction Tool.

	Construction	Financial activities	Information	Manu- facturing	Mining	Pro- fessional and business services	Public Admin- istration	Transportation	Utilities
<b>ILLINOIS</b>	\$57,857	\$144,884	\$81,551	\$72,232	\$73,752	\$92,787	\$58,401	\$51,381	\$120,325
Champaign	\$45,559	\$67,893	\$46,708	\$50,046	\$88,436	\$75,754	\$48,513	\$39,428	\$74,691
Clay	\$31,184	\$34,645	\$44,286	\$43,668	\$26,463	\$36,499	\$38,835	\$34,460	\$83,788
Coles	\$41,122	\$60,960	\$67,127	\$53,333	\$61,911	\$26,846	\$36,413	\$33,372	\$90,512
Cumberland	\$19,541	\$37,340	\$10,172	\$39,058	\$36,066	\$24,881	\$25,066	\$36,895	\$-
Douglas	\$56,374	\$43,297	\$25,214	\$74,741	\$42,469	\$60,848	\$25,177	\$50,033	\$106,358
Edgar	\$25,078	\$46,783	\$67,449	\$40,578	\$-	\$50,342	\$49,662	\$35,931	\$64,346
Effingham	\$35,387	\$54,693	\$49,576	\$41,616	\$22,063	\$47,648	\$49,934	\$45,089	\$91,192
Fayette	\$27,452	\$47,549	\$62,418	\$39,119	\$39,601	\$30,097	\$57,808	\$32,853	\$47,697
Ford	\$29,355	\$34,806	\$18,305	\$45,967	\$30,035	\$32,915	\$31,085	\$31,283	\$91,909
Jasper	\$20,678	\$47,895	\$18,577	\$38,959	\$23,336	\$50,231	\$25,326	\$36,993	\$82,392
Macon	\$47,413	\$60,255	\$34,126	\$81,700	\$39,873	\$44,138	\$52,023	\$54,693	\$97,731
Moultrie	\$35,757	\$41,567	\$41,789	\$52,456	\$-	\$37,822	\$32,742	\$37,920	\$44,817
Piatt	\$30,381	\$49,489	\$13,102	\$42,555	\$-	\$40,627	\$22,606	\$33,557	\$4,301
Shelby	\$26,772	\$50,997	\$19,170	\$54,211	\$33,248	\$63,024	\$48,525	\$30,121	\$104,689
Vermilion	\$35,560	\$59,328	\$53,704	\$52,814	\$22,891	\$37,092	\$37,129	\$34,274	\$63,098

Table 9—9: Change over time in resident income per capita. 2017 dollars. Data Source: Bureau of Economic Analysis, Table CA 30, Economic Profile.

Average Resident Income	Resident Income Per Capita, 2007	Average Earnings Per Job, 2007	Resident Income Per Capita, 2014	Average Earnings Per Job, 2014
Champaign	\$38,726	\$50,393	\$42,514	\$58,535
Clay	\$33,398	\$40,123	\$36,105	\$38,031
Coles	\$33,224	\$42,589	\$36,646	\$46,589
Cumberland	\$33,063	\$33,842	\$38,696	\$37,412
Douglas	\$40,357	\$48,852	\$46,438	\$51,675
Edgar	\$34,884	\$43,600	\$38,964	\$45,324
Effingham	\$38,136	\$41,500	\$45,279	\$44,609
Fayette	\$28,406	\$35,118	\$30,486	\$35,432
Ford	\$41,195	\$47,191	\$50,483	\$62,159
Jasper	\$33,112	\$37,329	\$42,427	\$45,796
Macon	\$42,305	\$57,448	\$44,397	\$60,772
Moultrie	\$43,428	\$62,383	\$56,853	\$84,130
Piatt	\$43,664	\$41,751	\$48,639	\$42,064
Shelby	\$34,049	\$38,103	\$37,500	\$40,899
Vermilion	\$33,394	\$47,458	\$36,486	\$50,237