Job Creation Factors for Inland and Near Dock Intermodal Facilities

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ABSTRACT
The major driving forces behind the establishment of intermodal facilities include number of jobs that will be created by the facility, freight performance improvement, and other economic benefits to the region. Job creation is the most tangible benefit that stakeholders use to justify the development of such facilities. This project explores different job creation factors for intermodal facilities in terms of facility types, management structures, financing options, and activitiesperformed. Near port and hinterland type facilities are analyzed separately. This project tests several hypotheses statistically to find the correlations among different job creation factors. The result shows that the public landlord model facility creates more jobs than the private operator model. The result also shows that facilities connected with well-established transportation network systems usually produce more jobs.

INTRODUCTION
In today's growing global economy, intermodal facilities have become increasingly popular as a method of increasing efficiency and decreasing costs across the entire spectrum of supply chain operations. Regions across the country are seeking to establish intermodal facilities as a means to fostereconomic development and jobs.

In order for a facility to be considered intermodal it must be accessible by more than one mode of transportation such as truck, rail, ship/barge, or plane. These facilities have various characteristics and a range of job creation results. This research attempts to identify what characteristics of intermodal freight facilities leads to greater intermodal related job creation. Specifically, it examines rail-to-truck container transfer facilities sited in inland locations and facilities near seaports that handle containers.

Statistical analysis indicates that intermodal facilities should not be a "field of dreams" approach to job creation[1]. Regions that already have an established intermodal industry appear to benefit most from the development of facilities. For both inland and near port facilities, larger facilities with greater capacity do not necessarily lead toward greater job creation.Despite being private sector driven infrastructure, the public sector can play an important role in developing these facilities in order to achieve better job creation outcomes.

Intermodal Freight Facilities
There are several ways to categorize intermodal facilities. This study focuses on freight mobility and does not consider passenger intermodal facilities (e.g., bus stations). A Transportation Research Board guide[2] to intermodal facilities categorized various types of freight facilities by their function:

- Distribution Centers
- Ports
- Intermodal Terminals
- Bulk or Transload Terminals
- Hub Terminals
- City Terminals
- Integrated Logistics Center or Freight Village

For this study, we are examining sites that function as intermodal terminals located either near a water port or inland. Various nomenclaturesareused for these types of facilities. Terms used to describe facilities that handle containerized cargo transfer between modes includes inland port, dry port, container freight station, inland freight terminal, container freight station (CFS), and intermodal freight center (IFC). For the purposes of this study, we will use the term intermodal freight facility (IFF).

> An Intermodal Freight Facility (IFF) is a component of the cargo transportation network where containerized goods are transferred from truck-to-rail and from rail-to-truck.

Characteristics of IFFs ThatAre Expected to Impact Job Creation

IFFs vary greatly in their container capacity, volume, size, roll in the supply chain, developable land in the vicinity, and other physical characteristics. They also differ in their funding, management, and organizational design. Studies were not found that examined the economic impact of these characteristics, but aspects such as container volume and size are expected to be associated with job creation. For example, port impact studies often use a container per job heuristic (e.g., a 1000 container increase in annual throughput supports between 0.9 and 1.2 additional direct jobs[3]). In addition to physical characteristics, we would expect financing arrangements, management arrangements, and organization to influence job creation. These are variables that will be used for the statistical analysis and will be introduced next.

Financing of IFFs

There are numerous models of financing IFFs, but because of the job creation potential, governments often provide public funding for intermodal facilities. The IFFs could use a number of financing options that range from private sector financing (e.g., a railroad company or private developer) to public authority funded. An increasing trend is the use of economic development incentives to support the financing. These economic incentives include grants, tax abatements, free land, bond financing, and loans. It would be expected that job creation targets are established for these public investments.

For example, as part of the financing for the Joliet Intermodal Terminal (JIT) the developer, CenterPoint Properties, received $100 to $125 million in tax incremental financing (TIF) support. The county targets at least 2,300 new jobs as a result of this incentive. Additionally in 2009, the State of Illinois enacted the Intermodal Facilities Promotion Act, which established a public-private partnership with CenterPoint Properties to build an intermodal terminal in Joliet operated by the Union Pacific (UP) Railroad. State income taxes from the jobs created at the new facility are placed in the Intermodal Facilities Promotion Fund, which reimburses CenterPoint for future improvements.

There are numerous other examples of public funding. Despite objections from local governments that went to the Virginia Supreme Court, the Virginia Rail Enhancement Fund is paying 70% of the cost of the $35 million Norfolk Southern (NS) facility near Roanoke. BNSF was provided 65% tax abatement along with over $25m in road connector construction for its intermodal facility in Kansas City. Even once the facilities are established, more public investment might be expected as many IFFs are attracting business through incentives. These attraction incentives often include attractive lease rates, bonding ability, or Foreign Trade Zones. At a minimum, the public sector will be expected to fund the roads and other infrastructure needed for industrial development.Job creation is the expected outcome from these investments.

Dryports

IFFs developed by port authorities would be expected to create jobs. In order to minimize crowding at the terminals, congestion, and prolonged dwell times, port authorities often establish dryports.

> A dryport is an inland intermodal terminal directly connected to seaport(s) with high capacity transport means(s), where customers can leave/pick up their standardized units as if directly to the seaport.

The best known example of a dryport in the US is the Virginia Inland Port (VIP) run by the Virginia Port Authority, which is a midrange dryport. There are three categories of dryports[4]. Distant dryports are typically over 300 miles from the seaport. The distance and freight flow make rail viable on a strict cost perspective. Midrange dry ports are situated within a distance that can be efficiently covered by trucks, but other factors (e.g., congestion in the port area) make consolidation cost effective. Finally, there are close dryports such as the Alameda Corridor that is only 18 miles from the Ports of Long Beach and Los Angeles. For this study, we did not differentiate dryports by category. Most port authorizes have job creation as part of their mission so economic development should be a consideration[5].

Organizational design and management

Intermodal facilities can be categorized into three different models according to their organizational design and management. These models are based on ownership of the facilities, management and over all leadership design. The models are:

- Landlord Intermodal Facility
- Operator Intermodal Facility and
- Developer Facility

Landlord Intermodal Facility: This is where intermodal infrastructures are built by the government and leased out to operators on a landlord-tenant basis, consequently, the main revenue streams are land rents and dues on the facilities. In general, landlord intermodal facilities do not aim for profit maximization, but have other objectives, such as economic development, traffic decongestion, pollution reduction, and the creation of efficient supply chain for industries in the area. However, landlord intermodal facilities are self-sustaining. This implies landlord intermodal facilities need to generate sufficient return on investment to finance new investments, therefore apart from leasing out the facilities, they also engage in active investments to improve the efficiency of the transport chain and the competitiveness of the intermodal facilities. The VIP is an example of the landlord model.

Operator Intermodal Facility: Most intermodal facilities in North America are driven by the operator model. Here, operators who are the rail companies own and manage such facilities. In most cases public involvement is such that the government only provides infrastructure in form of roads to the facility. Example of such facility is the Union Pacific at Laredo, Texas.

Developer Model Intermodal Facility: Here, a real estate developer builds the intermodal facility. There are a number of developers that specialize in establishing logistics parks around intermodal facilities. These include CenterPoint, which has developed the facility in Joliet, Illinois discussed earlier.Hillwood Investment Properties has established numerous IFFs including the Charleston Trade Center logistics and light manufacturing park near the Port of Charleston. The Allen Group is another developer that focuses on the development of logistics parks built around IFFs.

Economic Impact of Intermodal Freight Facilities

Just as leading companies use logistics and supply chain management to create strategic advantage, communities can take a similar approach in developing transportation capabilities to drive economic growth and create jobs. Intermodal facilities and logistics parks have been shown to be major catalysts for economic development. They attract warehousing and distribution companies, as well as, transportation service businesses including brokers and freight forwarders. The resulting establishment of adjacent industrial areas has significant employment and income effects.

The Tioga Group[6]compiled an inventory of intermodal hub studies and found the VIP in Front Royal spurred nearly $600 million in private capital investment while the Alliance Texas Logistics Park encouraged over a billion dollars in private investment, 18,000 permanent jobs, and $147 million in property taxes. The new $105 million Memphis Regional Intermodal Facility in Rossville, TN is expected to create or enhance 6,200 jobs in the Memphis region over the next 10 years with the capacity to handle 327,000 containers and trailers annually. The extent of the economic impact can be debated[7], but if done correctly, communities can create significant jobs through freight-based development. Table 1 shows some sample facilities and their corresponding job creation forecasts.

Table 1: Job Creation Forecasts from Intermodal Facility Impact Studies

Facility Name	Direct Jobs	Indirect Jobs
CSX Baltimore Intermodal facilities	187	1,300
Norfolk Southern Roanoke Intermodal facility	20	740 to 2,900
Norfolk Southern Birmingham Intermodal Facility		8,600
Prichard Intermodal Facility		700 to 1,000
North Charleston CSX intermodal Facility		869
Union Pacific Santa Teresa facility		600
Charlotte Regional Intermodal Facility	157	5,143
Rickenbacker Intermodal Terminal	150	20,000
Norfolk Southern East Tennessee Intermodal Terminal		1,800
Cordele Intermodal Center	50-100	2,000 and 3,000

An analysis of regional intermodal jobs pre and post development of a sampling of intermodal facilities found a range of job creation. Figure 1 shows that intermodal related job increases in the vicinity of intermodal facilities ranged from +60% to minus 10%. Each bar in the figure represents one facility in the sample. We found that regions around some facilities such

the Union Pacific facility at the Port of Laredo and the Virginia Inland Port experienced significant new intermodal related jobs while the St. Paul Intermodal facility and the Detroit Intermodal freight facility actual experienced declines in intermodal related employment. Thus there appears to be significant variation in job creation depending on the facility despite the claims of many impact studies.

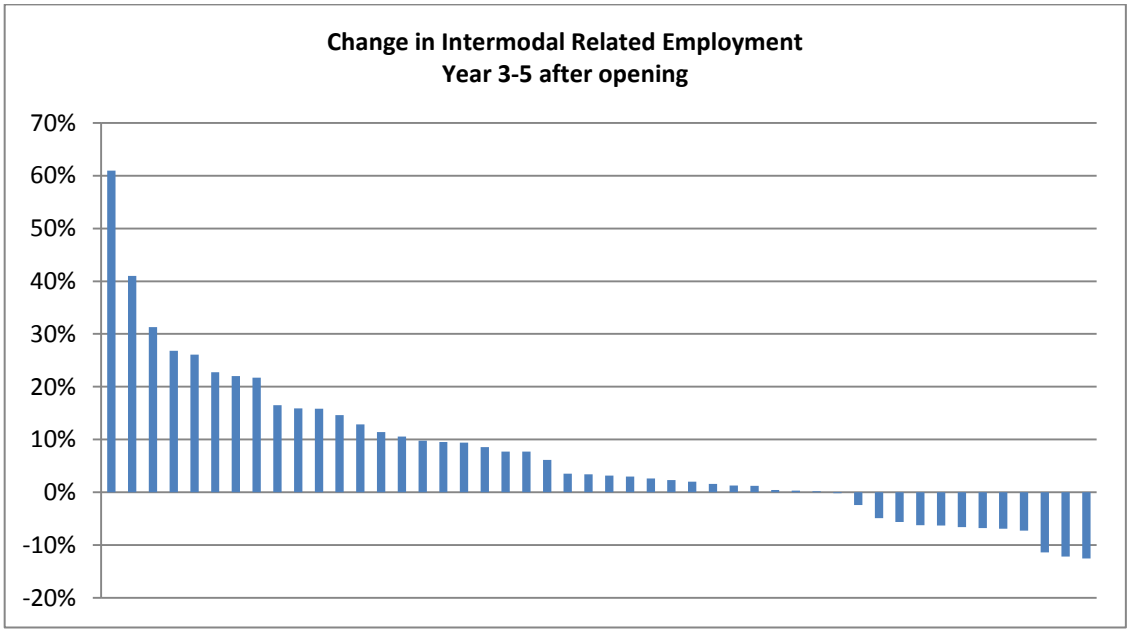

Figure 1: Change in Intermodal Related Employment at a Sampling of IFFs

METHODOLOGY

The focus of this research study is to determine what correlations exist, if any, between characteristics of intermodal facilities (with rail-to-truck container transfer) and economic development as measured by job growth in intermodal related occupations. Published secondary data sources were used to conduct this investigation. Internet research and surveys were conducted on each facility to collect data.

Analysis of Job Creation Factors at Inland IFFs

Thirty-nine facilities were selected that have rail-to-truck container transfer facilities and had been open for at least four years so that there would be time for employment impacts to be identified. The sample was screened to ensure that there was broad geographic coverage. While 184 possible intermodal facilities were identified, only 39 facilities met the criteria and had available data (See Table 2).

Table 2: Intermodal Facilities Included in the Analysis

(BNSF) St. Paul Intermodal Facility	(NS) Toledo, OH	(UP) Dallas Intermodal Terminal
Port of Pasco Intermodal Terminal	Auburn Intermodal Facility Maine	CN's Memphis Logistics Park
Charlotte Inland Terminal	(BNSF) Chicago (Willow Springs)	Port of Quincy Intermodal Terminal
(BNSF) Los Angeles Intermodal Facility	Stark County modal Terminal	(UP) Salt Lake City Intermodal Facility
ICTF (Long Beach)	(UP) Mesquite	CSX Chambersburg
Huntsville International Intermodal Center	(CN) Chicago	CSX Buffalo
(NS) Georgetown, KY	(UP) Marion	Somerset Rail Park
Port of Montana	CSX Intermodal Terminal in Fairburn	Kansas City Smart Port
CSX Baltimore	(NS) Bison Yard	Rickenbacker Intermodal Terminal
Virginia Inland Port	(BNSF) Logistics Park Chicago	San Antonio Intermodal Facility

(CPR) Minneapolis Intermodal Terminal	KCS The Jackson TransLoad Center	Tacoma South Intermodal Facility
(UP) Laredo	Rochelle Global 3 Intermodal Facility	(BNSF) Alliance Intermodal Facility
CSX Dewitt Yard	(UP) Tucson	CSX Detroit

Dependent Variable: Impact of Transportation Employment

Data collected to analyze the economic impact of an intermodal facility for this study included total employment in intermodal-related fields in the region three years prior to the opening of the intermodal facility. The three year data was averaged to measure pre-event employment. Data for the period three years after the establishment of the facility was used to measure the impact of the workforce trends. This allowed time for distribution centers and ancillary services to be attracted to the area by the new facility. The three years of post-event employment was averaged to measure the impact on employment. The Employment data for metropolitan and nonmetropolitan areas were retrieved from the Occupational Employment Statistics provided on the Bureau of Labor Statistics website. County level data by industry was found on the Bureau of Economic Analysis website. Employment for counties containing the facility and adjacent counties was included in the analysis. The percentage growth in logistics related employment was used as the dependent variable in the statistical analysis.

The Intermodal related occupations selected involved transportation and logistics directly connected to intermodal rail-to-truck transfer facilities. See Table 3 for the occupations SOC Code selected.

Table3: Transportation and Logistics Related Occupations

SOC Code	Description
53-1021	First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand
53-1031	First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators
53-3032	Heavy and Tractor-Trailer Truck Drivers
53-7062	Laborers and Freight, Stock, and Material Movers, Hand

Independent Variables: Facility Characteristics Expected to Influence Job Creation

Based on a literature review, the following factors were determined to potentially impact the level of job creation resulting from the establishment of an intermodal facility. These factors were coded and utilized for the statistical regression analysis.

1. Size of facility in acres
2. Annual container volume
3. Date of opening
4. Level of public funding
    a. No public funding
    b. Public funded connecting infrastructure
    c. Financial incentives
    d. Public/Private partnership
    e. Public Authority
5. Whether facility is a dry port
6. Access to highway or interstate
7. Management model for facility
    a. Landlord
    b. Railroad/operator
    c. Developer
8. Developable land around the facility- Measured by population density (persons per square mile in the county)

The following hypotheses were tested by the statistical analysis.

H1. The landlord intermodal facilitymodel is correlated with increased intermodal related jobs more than the other management models because public authorities are more concerned with economic development than private carriers or developers.

H2. Dryports are correlated with increased intermodal related jobs because public port authorities typically own them and have job creation as part of their mission.
H3. Public involvement in the funding of the facility should require certain job creation targets so intermodal facilities receiving extensive public funding should be correlated with increased intermodal related jobs.
H4. Greater throughput of the intermodal facilities should be correlated with increased intermodal related jobs.
H5. Greater size of the intermodal facilities should be correlated with increased intermodal related jobs because there is more conducive space for warehouses and distribution centers to locate.
H6. Lower population density in the county surrounding the facility should be correlated with increased intermodal related jobs because it should be less expensive to locate warehouses and distribution centers in the vicinity of the intermodal facility.

Statistical Analysis of the Inland IFFs

Regression analyses were used to analyze the effects of the independent variables on intermodal related employment growth. Several variables were statistically significant in the analysis. Table 4displays the regression results.

Table 4. Results of Statistical Analysis of Inland Port Facilities

	β	Std. Error	Sig.
(Constant)	**388115.09**	**200849.36**	**0.07**
Date	**-195.19**	**99.96**	**0.07**
PubInfra	**4760.84**	**2189.21**	**0.04**
PubIncent	-2790.06	1736.54	0.12
PPP	106.82	2055.64	0.96
PubAuth	-3620.72	2532.11	0.17
Dry Port	884.78	1463.24	0.55
Landlord	**4023.47**	**1983.82**	**0.06**
Developer	5412.99	3436.73	0.13
Size	-0.65	0.43	0.15
Container Vol	0.32	0.77	0.69
County Trans Empl	**0.11**	**0.02**	**0.00**
PopDensity	0.42	0.57	0.48
TotEmplChnge	106.94	97.85	0.29
Natl GDP Growth	-204.20	178.45	0.27
Metro Population	**0.00**	**0.00**	**0.04**
R Square	0.938		

The year of facility opening (Date) was negative and significant in the regression results, indicating that facilities that were opened earlier were more successful at creating intermodal related employment. The levels of public funding were entered as categorical dummy variables. The results for these variables are interpreted in comparison to a complete lack of public involvement. Only the publicly funded infrastructure variable was significant with a positive coefficient, meaning facilities that received publicly funded connecting infrastructure tended to be associated with better intermodal employment growth than purely privately funded facilities. The remaining measures of public involvement all had negative results. Facilities that received financial incentives, were public-private partnerships, or were completely public facilities were associated with lower intermodal employment growth compared with purely private facilities. However, these relationships were not statistically significant. The negative coefficients for these types of facilities should NOT be interpreted as indicating that

these types of facilities were associated with negative employment growth, just that they had slower growth than regions with purely private facilities.

The management model was also evaluated through the statistical analysis. As with the levels of public funding, they were entered as categorical dummy variables. The public landlord and developer management models were analyzed in comparison with the railroad operator model. The public landlord model was found to be associated with higher rates of intermodal employment growth when compared to the railroad operator model.

Counties that started with a higher level of transportation employment tended to have higher job creation after the intermodal facility opened. This indicates that regions were building on existing strengths when constructing successful intermodal facilities.

No other hypothesized relationships were found to be statistically significant. Total employment change in the facility's county and national GDP growth were used as control variables to account for broader economic conditions. Not surprisingly, the broad county employment growth measure was statistically significant in the model.

Evaluation of Inland IFF Hypotheses

Statistically significant results supported many of the public funding related hypotheses. Hypotheses 1 was supported. The landlord management model was associated with higher intermodal related employment growth.

The statistical results related to hypothesis 3 are a little more difficult to interpret. Each of the measures of public involvement was evaluated in comparison with purely private facilities. Only the measure of public involvment related to public infrastructure yielded statistically significant results. Public support of connecting infrastructure tended to be associated with higher intermodal job growth in comparison with purely private facilities, supporting hypothesis 3. However, the other three measures of public involvement (all indicating greater public involvement than the infrastructure support measure) yielded mixed results, none of which were statistically significant.

None of the remaining hypotheses were supported. The measures of facility size (hypothesis 4 and 5) were not statistically significant. Nor was the hypotheses related to developable land supported.

Analysis of Job Creation Factors at Near Dock IFFs

Twenty eight facilities were selected that are similar containerized near-dock facilities and had been open for at least four years so that there would be time for employment impacts to be identified (See Table 5). The sample was screened to ensure that there was broad geographic coverage.

Table 5: On-Dock and Near-Dock Facilities with Dates Opened Included in the Analysis

Dundalk Marine Terminal (1977)	Seagirt Marine Terminal (1990)
Ports America Packaging (1982)	Mobile Container Terminal (2008)
North Locust Point (1972)	Port of Tacoma Terminal 7 (1967)
Long Beach Container Terminal (1986)	Port of Tacoma East Blair One (1980)
Portsmouth Marine Terminal (1975)	Barbour's Cut Terminal (1977)
Pittsburgh Intermodal Terminal (1987)	Bayport Terminal (2006)
Elizabeth Marine Terminal (1958)	Conley Terminal (1988)
Wando Welch Terminal (1982)	Boston Autoport (1998)
Columbus Street Terminal (2007)	Garden City Terminal (2002)
North Charleston Terminal (1982)	Ocean Terminal (2002)
Baltimore Intermodal Container Transfer Facility (1988)	Target Corp Facility (2007)
Talleyrand Marine Terminal (1996)	IKEA Facility (2007)
FEC Rail Terminal (1996)	Heineken USA Facility (2008)
Norfolk International Terminals (1972)	Seagirt Marine Terminal (1990)

Dependent Variable: Impact of Transportation Employment

Data collected to analyze the economic impact of an intermodal facility for this study included finding the total employment and average annual wage in logistic related fields in the region three years prior to the opening of the intermodal facility to present data. This three year data was averaged to measure pre-event employment. Data going out to three years after the establishment of the facility was chosen in order to determine the impact of the workforce trends. This allowed time for distribution centers and ancillary services to be attracted to the area by the new facility. The latest three years of post-event employment was averaged to measure the impact on employment. The Employment data for metropolitan and nonmetropolitan areas were retrieved from the Occupational Employment Statistics page of the Bureau of Labor Statistics Website. County level data by industry was found on the Bureau of Economic Analysis website. Employment for counties containing the facility and adjacent counties was included in the analysis. The percentage growth in logistics related employment was used as the dependent variable in the statistical analysis.

Occupations were selected that involved transportation and logistics directly connected to intermodal rail-to-truck transfer facilities. These are the same types of jobs used in the hinterland IFF analysis.

Near Dock IFF Independent Variables: Characteristics Expected to Influence Job Creation

Based on the literature review, the following factors were determined to potentially impact the level of job creation resulting from the development of a near or on dock intermodal facility. These factors were coded and utilized for the statistical regression analysis.

1. Size of facility in acres
2. Annual container volume
3. Size of existing transportation sector

The following hypotheses were tested by the statistical analysis.

H1. Larger on-dock or near-dock facilities should be correlated with increased transportation related jobs.
H2. Greater throughput of the facilities should be correlated to increased transportation related jobs.
H3. Regions with large existing distribution sectors will capitalize on their strengths and see increased transportation related jobs after the opening of the on-dock or near-dock facilities.

Statistical Analysis of Near Dock Facilities

Regression analysis was used to analyze the effects of the independent variables on intermodal related employment growth. Several variables were statistically significant in the analysis. Table 6 displays the regression results.

Table 6: Results of Statistical Analysis of Near Dock Facilities

	β	Std. Error	Sig.
(Constant)	**1822.83**	**1268.71**	**0.17**
Size(Acres)	-0.71	2.07	0.74
Container Vol	**-0.002**	**0.00**	**0.00**
County Trans Empl	**0.07**	**0.02**	**0.00**
Natl GDP Growth	**-232.89**	**121.35**	**0.07**
Total County Empl Change	**0.01**	**0.01**	**0.09**
Metro Population	0.0002	0.00	0.35
	R Square	0.891	

Evaluation of Near Dock Facility Hypotheses

There were several variables that were statistically significant in the regression. However, none of the hypotheses were supported. The size of the facility (hypothesis 1) was not statistically significant in the analysis.

The measure of throughput, container volume, was statistically significant. However, the coefficient was negative, indicating that higher volume is associated with lower employment growth. This is perhaps an indication that near-port facilities automate the process of freight movement, reducing employment for a given level of throughput.

As with the inland port analysis, counties with higher beginning levels of transportation employment were associated with higher transportation employment growth. Again, it appears regions with strong transportation sectors capitalize on their strengths by creating further infrastructure.

SUMMARY OF JOB CREATION RESULTS

The characteristics of intermodal facilities and the regions in which they are located are diverse. Thus, it is difficult to draw any strong conclusions from correlations based on those characteristics. However, some trends did stand out.

It appears that there was an 'early mover' advantage related to IFF job creation. Facilities that opened earlier tended to have larger job creation numbers. This may indicate that the market for IFFs is becoming saturated – the advantageous locations have already been developed.

Intermodal facilities tend to be associated with greater job creation when they are built in regions with a higher level of transportation related employment to start with. This indicates that these regions are building on the existing strength of the region's transportation sector. As with any statistical analysis, there are regions that provide exceptions to these finding. The Virginia Inland Port is an example of an intermodal facility that was built in a region with very little transportation sector jobs. It was successful in attracting thousands of jobs to the Front Royal, Virginia region. However, Front Royal has some location advantages, most importantly being within 200 miles of major metropolitan areas such as Washington, DC, Baltimore, Pittsburgh, and Philadelphia.

The size of intermodal facilities has little or no relationship to job creation. Large facilities may be very efficient at moving large volumes of freight utilizing a small workforce. Conversely, small facilities may attract other transportation companies to the area.

Finally there is some evidence that publicly provided infrastructure can help create more jobs around an IFF. However, these results should be used in policymaking with extreme caution given the other conclusions discussed above. It is not clear that public support can overcome private sector logistical issues regarding the ideal location for successful IFFs.

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