



The employment impact of motor vehicle assembly plant openings[☆]



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ABSTRACT

Local governments often offer motor vehicle assembly plants large subsidies to locate in their jurisdiction. A frequent justification is that an assembly plant will attract upstream parts suppliers to locate nearby and provide manufacturing jobs. Using propensity score matching, I find that an assembly plant brings an average of 500 additional parts supplier jobs beyond the employment gains the region would have experienced without the assembly plant. This increase is far less than predicted by the input–output models that state development agencies often employ.

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1. Introduction

Local, state, and provincial governments in North America commonly use subsidies to attract employers to their jurisdictions. Motor vehicle assembly plants are one class of employers that has received particular attention and large incentive packages, often valued at hundreds of millions of dollars per plant opening. At assembly plants carmakers, such as Ford and Toyota, combine thousands of components produced by parts suppliers, such as Denso or American Axle, to produce a finished car. Assembly plants typically hire two thousand to four thousand employees, so an assembly plant that had no economic spillovers would imply subsidies of tens of thousands or hundreds of thousands of dollars per worker. Policymakers instead justify the subsidies to carmakers with claims that their assembly plants will spur indirect jobs, particularly by causing parts suppliers to locate nearby and increase local employment.

Evidence on the ability of new assembly plants to attract parts suppliers is mixed. In April 2002, Hyundai announced Montgomery, Alabama as the site for its first North American assembly plant. The plant opened in May 2005 and eventually hired 3000 employees. In 2003, even before Hyundai began production, Halla Climate Control

opened a car air conditioning factory which grew to employ 500 workers in the nearby town of Shorter. Dozens of suppliers did likewise. Overall, parts supplier employment within a 100 kilometer radius of Montgomery grew from 772 in 2002 to 4008 in 2008. That experience of growth contrasts with Alabama's first assembly plant, which Daimler opened in 1993 and which builds Mercedes sport utility vehicles in Vance. Although axle, dashboard, and automotive seating suppliers now have factories in the same county, the parts supplier employment in the region actually declined in the six years after the plant's announcement. Moreover, the region in North Carolina that Daimler reportedly considered before deciding on Vance gained parts supplier jobs even without an assembly plant.

Daimler and Hyundai were persuaded to open in Alabama in part because of rich incentive packages. Press accounts value the offer Daimler received at \$250 million and the subsidies Hyundai received at \$118 million.¹ Alabama is far from alone in offering such

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¹ A combination of the State of Alabama, City of Tuscaloosa, Tuscaloosa County, City of Birmingham, and Jefferson County finance the incentive package Daimler received. Much of it was in the form of property tax breaks, but it also included immediate costs, such as \$30 million to purchase a 1000 acre site (Cooper and Ruffenach, 1993). Some contemporary press accounts estimated Daimler's incentives to be worth \$300 million, others at "more than \$100 million." Hyundai chose Alabama over Kentucky, which had offered a slightly larger \$123 million incentive package (Lyne, 2002).

large subsidies to automakers. The builder of the most recent North American assembly plant, Volkswagen, is reportedly benefiting from a \$500 million package of subsidies financed by the State of Tennessee and local governments around Chattanooga. An accurate estimate of the indirect jobs brought by the assembly plant is necessary to assess the benefits associated with such large public outlays.

This article analyzes the impact of assembly plant openings on local employment using a direct measure of parts supplier employment. It compares the employment gains in regions that landed assembly plants with those in comparable regions that did not. Using such a control group is necessary, because assembly plants are not placed at random. Instead carmakers build at locations they consider to be especially favorable to manufacturing plants. The sites chosen for assembly plants therefore might be expected to attract parts suppliers even without the assembly plant. The additional parts supplier jobs caused by an assembly plant can be estimated from employment gains above what were experienced in a control group with no assembly plants.

I construct two control groups. The first comprises sites that narrowly lost bids to host new assembly plants. Carmakers usually select two to five finalist sites, which sometimes become publicly known, from dozens of candidate locations before announcing one of the finalists as the winning site. The losing finalist sites are thus a collection of locations carmakers themselves consider most similar to the selected site in manufacturing plant profitability.

The second and main control group is generated from propensity score matches to assembly plant sites. These sites appear from observable variables to have been just as likely to receive assembly plants as those that actually did. The main difference, then, is the opening of an assembly plant. The differences in employment growth between the winning region and its propensity score matches are estimates of the structural effect of receiving an assembly plant. Not all new assembly plants have known losing finalist sites, but every assembly plant has propensity score matches. Propensity score matching allows for a large set of comparisons, and this leads to more precise estimates of the effects of assembly plant placement on parts supplier employment.

The estimated impacts of new assembly plants are variable and, on average, small. A new assembly plant causes an average increase of only 500 parts supplier jobs within 100 km five years after its announcement. In a few cases, new assembly plants brought or preserved thousands of parts supplier jobs, but regional parts supplier employment at the majority of control group matches outgrew that of the sites with new assembly plants. Because the employment impact is so variable and so near zero, thirty years of assembly plant openings are insufficient to provide statistical confidence that there is any positive employment spillovers in even the most closely related sector. One can reject a hypothesis that a new assembly plant causes an average impact of 6000 or more parts supplier jobs within a 100 kilometer radius. In the South, which has been particularly active in subsidizing assembly plants, the outcomes have been less variable. There an average impact of 2000 or more parts supplier jobs may be rejected.

At a wider geographic range or with longer periods after the announcement, the employment impact is slightly larger. How far the influence of assembly plant reaches gives insight into why and how assembly plants bring indirect jobs. The largest net employment gains accrue to locations within 200 km of the assembly plant site. This radius is further than the distances usually associated with labor market pooling or knowledge spillovers from personal contacts. The dispersion of the additional parts suppliers also means county governments providing subsidies will not internalize all the benefits. Furthermore, only when assembly plants open near the center of a large state can state governments capture most of the jobs created by their financial incentives.

1.1. Literature review

The small impact found in this article contrasts with huge impacts implied by some policymakers and predicted by some impact assessments. For example, Illinois state officials projected that Mitsubishi's arrival in Bloomington would bring 1100 parts supplier jobs to McLean County and 8000 to Central Illinois (Chapman et al., 1995). More recently, following the Volkswagen announcement, the local press reported Tennessee's "Governor Bredesen said the 2000 direct jobs at VW are 'the tip of the iceberg'" (Pare, 2008). Connaughton and Madsen (2001) review two projections based on input–output studies. The South Carolina Development Office used RIMS II multipliers to predict their BMW assembly plant would attract 2793 direct supplier jobs and 5444 jobs in other sectors. Alabama commissioned a study based on IMPLANS multipliers that projected that Daimler's Vance assembly plant would bring 2875 direct supply chain jobs and 5200 jobs in other sectors. Although different industry definitions or different geographical regions (such as using state boundaries instead of a 100 kilometer radius) may cause some of the apparent differences with the smaller employment gains observed in this article, the optimistic forecasts of policymakers may reflect the limitations of the input–output framework. Many impact assessment models are calibrated based on the observed patterns of colocation between industries, but they are unable to differentiate between suppliers being attracted to assembly plants, suppliers being attracted to the same business environment that attracted the assembly plants, and suppliers being attracted to other suppliers already near the assembly plant site. This article, in contrast, uses a direct measure of how many suppliers a new assembly plant can bring.

Discrete choice studies of parts suppliers location choice decisions show assembly plants have only moderate influence on the placement of parts suppliers. The locations parts suppliers select reveals the preferences for location characteristics, so variations of logit and multinomial logit estimation can show how important assembly plant proximity is relative to other considerations. Rosenbaum (2013) finds that 1000 miles of distance to an assembly plant has less influence on supplier location than a right-to-work law. Smith and Florida (1994) and Klier and McMillen (2008) both find suppliers slightly more likely to enter counties close to assembly plants, but the presence of an interstate highway is as important as 200 miles of distance to the nearest assembly plant. The low priority parts suppliers place on locating near an assembly plant suggests a low parts supplier employment impact from a new assembly plant, but the existing literature on parts supplier employment does not estimate that number. Adams (2015) considers counterfactual placement of assembly plants using a dynamic entry and exit model and finds small changes in the number of supplier plants near new assembly plant sites.

Previous work has studied the impact of large plant openings generally on employment (Edmiston, 2004), income (Fox and Murray, 2004), land values (Greenstone and Moretti, 2004), and incumbent plant productivity (Greenstone et al., 2010). However, employment multiplier effects vary widely across industries (Moretti, 2010). Thus industry-specific analyses (such as Artz et al. (2007) for meat-packing or Munasib and Rickman (2015) for oil extraction) are needed for industry-specific policy recommendations. This work contributes an industry specific analysis for motor vehicle manufacturing, which generates especially large subsidies and policy interest.

2. Data

My source for parts supplier employment is the United States Census's County Business Patterns. For every county, County Business Patterns annually reports the number of plants and the total

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