Million Dollar Plants –
A golden bullet for regional development?

Matthias Brachert[1], Eva Dettmann[1,2] and Mirko Titze[1]

[1] *Halle Institute for Economic Research (IWH)*
[2] *Research Institute on Sustainable Economic Growth (CNR-IRCrES)*

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Extended Abstract

Subsidizing large-scale investment projects is a central element of structural policy worldwide. The relocation or setting up of so-called Million Dollar plants attract a great deal of political, social, and economic attention. The hopes associated with such projects usually center on the economic revitalization of a region: new jobs and added value, additional tax revenue, increased innovative strength, and population growth. They are also associated with long-term multiplier effects – further settlements, start-ups, the enhancement of the regional image, and infrastructural improvements are intended to further promote regional development. In a nutshell, large investment projects are expected to serve as catalysts for regional transformation.

Even though, according to growth theory (e.g. Aghion and Howitt 2006, Lucas 1988, Solow 1956) and new economic geography (e.g. Duranton and Puga 2004, Krugman 1991), particularly investment projects in technology-intensive industries are considered suitable for activating endogenous growth and initiating self-sustaining development processes, establishing Million Dollar plants is rarely free of conflict. In economic, social, and regional research, also critical aspects like the risk of deadweight effects from subsidies offered for the projects, possible displacement effects on the (regional) labor market, regional overload (e.g., due to pressure on the housing market, transportation and administrative capacities), or environmental pollution due to heavy land or resource consumption, emissions, or interventions in sensitive natural areas are addressed. Moreover, social tensions caused by what is perceived as an unfair distribution of the benefits and burdens of large-scale projects are subject of public debate.

Empirical evidence on causal effects of large-scale investments on the regional economy is available only for North America so far, and is exclusively based on information on 47 large business location decisions in the manufacturing sector between 1982 and 1992, the "Million Dollar Plants data" of Greenstone and Moretti (2003). The core of this data is the regional ranking of potential settlement locations published in the Site Selection journal, as well as information about "winners" (i.e., regions where the investment takes place) and "direct losers" (i.e., regions that are considered as second best solution for a planned corporate settlement in the final stage of the selection process). The studies regard the decision result as a quasi-experiment, and compare both regions within an augmented Cobb-Douglas production function focusing on economic effects like productivity, employment, knowledge transfer and labor costs (see e.g. Giroud et al. 2024, Greenstone et al. 2010, Fons-Rosen et al. 2017). Most studies suggest positive impacts of a large-scale investment on the regional economy. However, depending on the model specification, the selected comparison regions and considered additional

firm characteristics, the effects differ remarkably, e. g. the estimated Total Factor Productivity effects on incumbent firms vary between 2 and 12 percent (see Giroud et al. 2024, Greenstone et al. 2010, Patrick and Partridge 2022).

Besides effects on incumbent firms, empirical literature provides examples for broader effects of large-scale investments on the region. In the context of regional innovation systems, large firms act as institutional anchor points that bundle, coordinate, and stabilize innovation activities Agrawal and Cockburn (2003), Karlsen (2013) and thus, substantially contribute to knowledge transfer and transformation, particularly in related economic sectors. On the other hand, the settlement or relocation of large firms can lead to an overload of local resources – which triggers price increases and/or displacement effects. For instance, the investment-induced regional wage increase is more pronounced for high-skilled workers (Greenstone et al. 2010). Moreover, Bhardwaj et al. (2022) show that large investments cause an inflation for local retail prices and contribute to a growing inequality in real income. Particularly in regions with limited available land, potential wage increases are "skimmed off" in the form of higher rents and land prices (Combes et al. 2019), which also affects (small) agricultural firms. Besides, impacts on the (transportation) infrastructure and regional ecosystems are discussed in the literature.

One of our contributions to the literature is the development of a multidimensional indicator system for the assessment of large-scale investment projects, considering economic, social and environmental dimensions as well as political aspects of the investments over time. The system consists of seven indicator clusters, each containing a set of single indicators that represent specific aspects of the investment and the expected impacts.
The *investment profile* describes not only physical infrastructure such as buildings or machinery, but also intangible components such as research and development, measures for environmental sustainability, and social infrastructure. This cluster allows to draw conclusions on the character of the project: capital-intensive, knowledge-based, sustainable, labor-intensive, or a combination of these characteristics.
The second cluster summarizes the *public contributions*, that can be divided into three categories: *first*, direct grants, i.e., subsidies, premiums, or tax breaks granted directly to the investing firm; *second*, co-financing, which means public participation in projects (e. g. research institutions, training centers, or innovation networks); and *third*, investments in project-related public infrastructure, in particular transport connections, energy supply, water management, or digital networks, which upgrade the region and can have an economic impact beyond the specific project.
The key political target of large-scale investments have been regional *labor market effects*. In this cluster, indicators characterizing the quantity and quality of the investment-induced employment (number of created jobs, type of jobs, the qualification profile and income level), but also vocational training positions and potential displacement are collected.
Regional development dynamics includes spillover effects on the regional economy (e.g. revenue growth of incumbent firms, start-ups in related sectors, R&D expenditures, R&D cooperation), demographic aspects, and spatial developments (amount of traffic, use of public transport, housing prices, child care facilities).
The cluster *environment and land use* characterizes the consumption of natural resources (e.g. sealed surface, water, potential interventions in ecologically valuable areas), emissions (air pollution, noise and dust emissions) and the perception of environmental impacts by the local inhabitants.
The last mentioned point is connected to the *social acceptance*, the sixth cluster, which summarizes indicators describing the participation of local inhabitants in decision processes, the image of the investment, trust in local gvernment decisions, and social cohesion and changes

in perceived quality of life.
Potential risks and long-term effects is dedicated to the comprehensive assessment of long-term structural effects and potential risks like structural path dependence, stability of supply chains, sustainability of regional employment, and potential bottlenecks (structural unemployment, mismatch, polarization).

In our empirical analysis, we focus on subsidized German large-scale investments registered in the GRW funding statistics of the Federal Office for Economic Affairs and Export Control (BAFA) for the years 2010 to 2024. Using the location information, we combine the funding data with regional information from the GENESIS Regional Statistics of the Federal Statistical Office of Germany and regional labor market data from the Federal Employment Agency. Building on empirical literature and the thresholds established in European funding practice, we apply an investment-related definition of large-scale investments: projects with (inflation-adjusted) reference values of at least € 50 million. This definition allows for different types of projects to be captured, including new establishments, site expansions, and technological transformations.

We observe a broad range of large-scale investments in Germany – with heterogeneous sectoral and technological characteristics, different ecological impacts, and with varying degrees of compatibility with the existing regional economic structure. About half of the total amount of the investments is attributable to the sectors[1] manufacturing of motor vehicles and automotive parts, optics and microelectronics, chemical products, logistics. While, e.g., relatively labor-intensive projects are implemented in the logistics sector, the opposite is true for the investments in (capital-intensive) chemical production. Manufacturing of automotive parts and chemical products in particular are associated with intensive water and energy consumption, which has substantial ecological impacts.
The projects in Germany also differ with regard to their knowledge and technology content.[2] Although the majority of the investment amount is spent on projects characterized by medium to high R&D intensity and a focus on process innovation, we also find many projects with medium to low R&D intensity and occasional R&D as well as projects with low research and knowledge intensity.

Accordingly, we expect heterogeneous effects of the subsidized investments, e.g. on the quality of regional employment and regional productivity. Therefore, it would not be sufficient to estimate only an average effect for all large-scale investments. Instead, we plan a two-step estimation procedure. In the first step, we will develop a classification system of the German investments using cluster techniques. In the second step, we will conduct cluster-specific causal analyzes on the basis of synthetic control groups.

Keywords:
million dollar plants, regional development, place-based policy, causal analysis, synthetic control groups

JEL Classifications: C14, D04, H25, H71, R11

[1] The sector classification corresponds to the 2-digit level of the NACE Rev.2 classification system.
[2] We apply the typology of Gehrke et al. (2013), so-called "NIW/ISI/ZEW list 2012" to capture the degree of R&D intensity and other innovation-related characteristics.

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