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Resource-based cities and the Dutch disease

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ABSTRACT

This paper examines the relationship between resource development and industrialization. When transport costs are high, the region with a more valuable natural resource enjoys a higher welfare than the other region. However, as transport costs decrease, firms begin to move out of the region, causing the Dutch disease to occur, initially in terms of industry share, and eventually in terms of welfare too when transport is sufficiently free. A resource boom in intermediate inputs may strengthen the tendency for manufacturing agglomeration in the same region, but a resource boom in consumption inputs will weaken this tendency. The model thus provides insight for cities to utilize their limited resources efficiently.

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1. Introduction

Natural resources could be both a blessing and a curse. Many cities, metropolitan areas and industry clusters emerged and prospered after the discovery of rich natural resources nearby, yet, many of them declined and some even disappeared, after the depletion of the resources. For instance, China

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had about 666 cities in 1996, among which 126 were classified as the resource-type (Department of Homeland and Resources, China). But about 10–20% of the resource-type cities were further classified as “hopeless” due to resource depletion, and many others were facing serious danger of heavy pollution and trapped with negative growth and high unemployment.¹ Also, after the first mine opened in 1890, “the city of coal in Japan”, Yubari, reached its highest population of 116,908 in 1960, but 90% of it moved away after the mines closed in the 1990s. Similar phenomena are documented by Barbier (2005, Chapter 2), finding that many resource-abundant countries may not necessarily end up exploiting natural endowment efficiently. In contrast, some resource-based cities and regions are more successful. In China, Baotou, Daqing, Tangshan and Jiaozuo are considered model cities that grew on natural resources and still maintain more than 2 million current population each (Tangshan has 7 million).

One cannot help but ask, what is the difference between the two types of resource based cities/regions, especially with regards to sustainable economic development? It turned out that the successful ones effectively utilized their resources in building related industries, such as oil refining, mineral processing, metal fabrication, transportation, storage, forest and soil conservation, paper pulp and carpentry, environmental protection, water purification, etc. As such, even when natural resources come to be depleted, an industry base has been built and especially technology and management skills are learned and developed. These are essential elements in attracting workers, markets and eventually firms. It is well-known that Southern France is able to use its combination of climate and soil to not only grow grapes, but also produce the highest quality of wines and brandy, in addition to attracting millions of tourists every year.

In the present paper, we intend to model the above phenomena. The issues originally arose from Netherlands’ natural gas discovery in 1959 and the fact that it hurt the competitiveness of Dutch manufacturing—the so-called “Dutch disease.” Corden and Neary (1982) and Corden (1984) are the early theoretical studies on the topic, who clearly demonstrate that an increase in natural resources will raise the labor demands in both the extraction industry and the nontraded good sector, driving workers away from manufacturing and raising the relative price of the nontraded good. However, their setting is a small open economy with fixed prices of manufacturing goods. And all goods are either freely traded or nontradable; In other words, trade and transport costs are not explicitly modeled, but these are essential as the world economy becomes increasingly more integrated under globalization.

In our view, the development of cities crucially depends on how resources are used, namely, whether resources are consumed directly or used in building manufacturing makes a big difference. The present paper reexamines the Dutch disease, taking an approach commonly used in New Economic Geography (NEG).² In particular, we incorporate industrial agglomeration with increasing returns in manufacturing and consider transport costs, but remove several restrictions usually imposed in the NEG literature.

In our setup, natural resources are extracted and transformed to resource goods, which are used as intermediate goods in the manufacturing sector and/or as final goods for consumption. In the real world, some resource goods are used both as intermediate as well as final goods, while some others are used in consumption only.³ We especially focus on region-specific resources, such as glaciers in the Alps that can produce spring water as well as attract tourists and skiers, the combination of sunshine and dry and rich soil in Southern Europe that produces high-quality wine, adjacency to the sea by which beautiful beaches are decorated and seashores are used as fishing bases, a hot and wet climate that produces juicy tropical fruits, etc. The BP oil spill in the Gulf of Mexico in 2010 caused extensive damage to the Gulf’s fishing and tourism industries as well as marine and wildlife habitats, conversely demonstrating the industry linkages through the use of natural resources.

¹ See “The transitional pain of resource cities” (in Chinese): <http://finance.sina.com.cn/chanjing/sdbd/20090611/08486334226.shtml>.

² Basic references are Fujita et al. (1999) and Baldwin et al. (2003).

³ As examples of the former resource goods, sea water is purified to be used both in production and for consumption; corn and beets are directly consumed and used as petroleum substitutes for fuel sources. Additional examples include forests, glaciers and other minerals. For the latter type of resources, examples include tropical fruits, beaches, ski slopes, and even some scarce minerals.

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