The Leontief Matrix, the Keynesian Cross, and Economic Insensibility of Hosting the Olympics: A Survey of the Korean Experience*

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Abstract Korea will have hosted 13 international mega-events by 2018. The rationale for attracting an event to Korea is often its economic impact, namely, induced production, income, and employment effects. These effects are estimated by one of the state-run research institutes using the Leontief input-output model. One big problem with such a practice is that the model is inapplicable to the national decision whether to host a mega-event. As a consequence of inappropriate feasibility studies, national resources might possibly have been misallocated over decades. The Keynesian cross is not applicable, either. Instead of those two popular models, a holistic cost-benefit analysis should be conducted for a national project. This paper reviews a total of 17 feasibility studies for 13 mega-events, explains their methodological and practical errors, and suggests the right approach.

Key Words: Sports Mega-event, Olympics, Economic Impacts, Leontief Input-output Table

JEL Code: C67, E65, H54


* This work was supported by the research fund of Hanyang University (HY-2013-N). The author greatly appreciates the insightful feedback from anonymous referees.

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I. Introduction

At the news in July 2011 of Korea’s winning the bid for the 2018 Winter Olympics, the whole nation was put in a great euphoria: from the president to business chieftains to lay people, from elementary school children to Buddhist monks, from politicians to economists, and from the right wing to the left (see e.g., Chosun, 2011a; Hankyoreh, 2011; NYT, 2011a, b; WSJ, 2011b, d). Few critical voices have been heard in the public arena.

Bidding committee members and some others were especially proud that Korea is to become the sixth so-called grand-slam country in the world to host all of the four major sports events (e.g., KDI, 2011; KMCST, 2011): the Summer Olympics, the Winter Olympics, the football World Cup, and the World Championship in Athletics—a privilege even the U.S. does not have. As a matter of fact, Korea has been uniquely outstanding in attracting and “successfully managing” international mega-events: two Olympics (including the 2018 Olympics), one World Cup, one Athletic Championship, four Asian Games, three Universiades, and two Expos (a total of 13 over three decades). In addition, Korea made a failed bid for the 2022 World Cup and plans to apply for the 2024 Summer Olympics (or possibly a later edition due to Tokyo’s winning of the 2020 Olympics in 2013).

Korea’s rationale for hosting sports events is similar to that elsewhere in the world: job creation, tourism and trade promotion, people’s feel-good, regional development, and so on. On top of these, many Koreans add enhancement of the societal harmony, uplift of the national status, and contribution to a peaceful reunification of the Korean peninsula.

One of the elementary teachings in economics is that there is no such thing as a free lunch. Then, the Korean people should consider what prices they have to pay in order to have all those good things from a mega-event. They
should also check *ex post* whether the expected benefits have been actually realized. However, few opinion leaders think twice about the cost side of such events, even if Korea has had many of them and invested a great sum of money in each of them. No serious academic research about the cost-benefit of hosting sports events or meaningful evaluation of the past events has been conducted, either.

To reflect on the general practices in Korea, one of the state-run research institutes publishes a feasibility study around the time of bidding for an international event. There, the input-output analysis model devised by Wassily Leontief ("the Leontief matrix") is used in estimation of the economic impact of the event. Once such a study identifies a few numeral figures as representing the overall economic effects, they immediately become the national standards and are repeatedly cited by all the concerned parties. Unfortunately, however, the Leontief matrix is anything but to be used in justification of an international event.

By conducting feasibility studies in the wrong way, various state-run institutes might have been effectively misleading Korea's public opinion for nearly three decades. This particular practice, i.e., decision-making on the basis of the Leontief matrix, might well be discontinued because each and every event requires a gigantic sum of subsidies from the central government.

In this paper, I discuss problems with Korea's *official* feasibility studies for international mega-events. My main focus is on the mischoice of the Leontief matrix as the study tool. In Section II, I analyze feasibility studies for mega-events in Korea and discuss why the common methodology is irrelevant. In Section III, I briefly review the inapplicability of the Keynesian cross to mega-events. Section IV is to suggest the right way to appraise the economic impact of a national investment project. In Section V, I make an overview of literature on economic and extra-economic aspects of the past
mega-events in the world in order to take lessons from them. Section VI is to close this paper.

II. Korea’s Golden Rule: The Leontief Matrix

I have reviewed a total of 17 feasibility studies for 13 mega-events held, to be held, or to be bid for. I find that the Leontief matrix is used in every case. TABLE 1 is a summary of induced economic effects as claimed in those studies which are mostly commissioned by the host city or the organizing committee of the event under study.

1. The Golden Rule

Seoul was chosen in September 1981 as the host city for the 1988 Summer Olympics. It was the first international mega-event ever for Korea to manage. In November 1981, Seoul was additionally selected as the site of the 1986 Asian Games.

The first showcase. A feasibility study for the 1988 Olympics was made for the first time by Korea Development Institute in 1984 (KDI, 1984). In that study, the 1986 Asian Games is treated as a rehearsal for the soon-to-follow

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1) The number 13 needs some clarification: the total number of mega-events held in Korea will be 13 as of 2018, for one of which a feasibility study was not found to have been conducted (1999 Kangwon Asian Games); this work includes one feasibility study for an event which is yet to be bid for (2024 Busan Olympics), making the total number of events covered here 13.

Of the 17 feasibility studies for the 13 events by various research institutes, I indirectly checked two studies for the 2011 Daegu World Championship of Athletics because I could not obtain the full text of the study reports. As the last resort, I contacted the research institute and the primary author of the two reports, but both declined to disclose.
### Table 1: Economic Impact of Major Events as per Research Institutes

<table>
<thead>
<tr>
<th>Event</th>
<th>Feasibility Study</th>
<th>“Induced Economic Effects” (trillion won/ thousand jobs)</th>
<th>Year-round Jobs</th>
<th>Estimation base</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986 S. Asian Games/ 1988 Summer Olympics (Seoul)</td>
<td>KDI 1984, KDI 1987, KDI 1989</td>
<td>Total Cost (Const. %)</td>
<td>Total Output VA (% of TC)</td>
<td>1980 IOT from BOK</td>
</tr>
<tr>
<td>1993 Expo (Daejeon)</td>
<td>KIET 1990</td>
<td>♣ 1.7 (74)</td>
<td>3.1</td>
<td>1987 IOT</td>
</tr>
<tr>
<td>1997 W. Universiade (Muju • Chonju)</td>
<td>BOK 1996</td>
<td>1.1 (98)</td>
<td>2.1</td>
<td>43</td>
</tr>
<tr>
<td>1999 W. Asian Games (Kangwon)</td>
<td>N/A</td>
<td>** 0.2 (92)</td>
<td></td>
<td>No trace of a feasibility study</td>
</tr>
<tr>
<td>2002 World Cup (Ten cities)</td>
<td>KDI 1998, KDI 2001</td>
<td>♣ 2.4 (69)</td>
<td>♣ 3.7 (154)</td>
<td>245</td>
</tr>
<tr>
<td>2002 S. Asian Games (Busan)</td>
<td>BDI 2000</td>
<td>♣ 5.3 (87)</td>
<td>12.0</td>
<td>2002 IOT</td>
</tr>
<tr>
<td>2003 S. Universiade (Daegu)</td>
<td>DGDI 2000, DGDI 2004, DGDI 2007</td>
<td>♣ 0.3 (23)</td>
<td>0.4</td>
<td>26</td>
</tr>
<tr>
<td>2011 Athletics (Daegu)</td>
<td>DGDI 2004, DGDI 2007</td>
<td>♣ 0.1 (54)</td>
<td>0.2</td>
<td>3</td>
</tr>
<tr>
<td>2012 Expo (Yeosu)</td>
<td>KIET 2004</td>
<td>♣ 3.7 (47)</td>
<td>10.8</td>
<td>157</td>
</tr>
<tr>
<td>2018 Winter Olympics (Pyeongchang)</td>
<td>KIET 2008, HRI 2011</td>
<td>♣ 5.9 (72)</td>
<td>♣ 8.8 (129)</td>
<td>230</td>
</tr>
<tr>
<td>2020 Summer Olympics (Busan): → To 2024</td>
<td>KCTI 2008</td>
<td>5.2 (63)</td>
<td>12.7</td>
<td>115</td>
</tr>
</tbody>
</table>

Note: Const. %: construction cost as the percentage of the total; % of TC: as the percentage of the total cost; IOT: input-output table; IDE: Institute of Developing Economies in Japan.

* Figures adjusted to remove unexplained tourism effects.

** KAWGOC 1999.

♣ Spending by foreign or all tourists included: substantial in Expos, insignificant in sports events.

♦ Keynesian multiplier effect included.

Sources and abbreviations: See References.
Olympics. There, the Leontief matrix is used as the framework for estimation of the economic benefits from the Olympics. Specific parameters, most of which are in the form of a coefficient, from the 1980 Input-Output Tables (IOT) published by the Bank of Korea (BOK) are applied to this framework in calculation of the economic effects.

Ever since the 1984 KDI study, the Leontief matrix has become the golden rule, and has been used in all the studies by various institutes for the ensuing events. Each study concludes its economic impact section with the following three numbers:

1) “Production inducement effect” (meaning a change in the total output = total input)
2) “Income inducement effect” (meaning a change in the value added)
3) “Employment inducement effect” (meaning a change in the cumulative year-round jobs)

These three effects are the so-called direct economic benefits which are the main focus of this paper. Other indirect effects are sometimes called legacy benefits.

Public Perceptions. There are several flaws in those feasibility-study reports: some technical and others critical. Flaws notwithstanding, such a report is regarded as authentic by the public and accordingly it renders a great power to those three numbers. They are quoted time and again by opinion leaders such as politicians, organizing committee members, news reporters, commentators, college professors, and other interest groups.

One technical flaw of such reports is that costs are often explained separately from benefits. Many people who quote the three numbers fail to take the hosting costs into account. Another flaw is that the authors are not kind enough to elaborate what the three numbers really mean, even if they are treated as the crown jewels of their study. These numbers are very
difficult for the lay people to understand (cf. Footnote 2). As a result, few people really know how those three numbers affect the Korean economy.

A vast majority of the Korean people simply believe what opinion leaders publicly reiterate, that is, the upcoming event being a rare opportunity of a great economic boon. For example, at the time of the decision about the 2018 Olympics, a brief analysis from Hyundai Research Institute (HRI, 2011) was widely quoted by Korean news reporters and opinion leaders. One of the outstanding headlines was “Economic Benefits to 65 trillion won: Money, not Snow, Dumps upon Us” (Chosun, 2011b see also WSJ, 2011c; KDI, 2011). This HRI calculation is also based on the Leontief matrix. The “65 trillion-won” boon comprises of direct benefits for 21 trillion Korean won and legacy benefits over 10 years to come for 44 trillion won.

**Sketch of the golden rule.** There are wide variations of the Leontief matrix depending on the main focus of and the assumptions made for a study. For example, the national economy is the unit of study some times while the interregional relationships are also taken into account other times. Imports are separated from domestic products some times while they are not other times. Here, I explain the particular variation, popularly known as the \((I - A^d)^{-1}\) type, that the BOK (2007) recommends for the general purpose and KDI has used in various occasions.

The first step in application of the golden rule is to estimate the total cost for the targeted event with help from the organizing committee or the host-city government. The total cost consists of three categories:

1) Category 1 (operational costs of the organizing committee): labor, technology, logistics and promotion costs with regard to the general administration, meetings and conferences, ceremonies and individual games.

2) Category 2 (direct investment costs): construction of competition venues,
related facilities, players’ villages, an international broadcasting center, and media press centers. These facilities are required by the Olympic Charter (IOC, 2010).

3) Category 3 (indirect investment costs): construction of roads, railways, buildings, artistic structures and hotels to facilitate activities related to the event.

The second step is to subtract the estimated amount of imported final goods from the total cost. This leaves the total amount of final goods from domestic production. Then, this amount is fed in the Leontief matrix prepared by the BOK for the most recent year possible. Taking the amount of the final demand in, the matrix spits out the necessary numbers as induced economic effects. The basic structure of the matrix for the macroeconomy is illustrated in FIGURE 1-a. The relationships between this matrix and key macroeconomic variables are further explained in the following subsection II-4.

Take the first-ever KDI analysis (1984 based on the 1980 IOT) for example. The numbers from that study *(cf. TABLE 1)* and notations in FIGURE 1-c match as follows:

Total cost for the 1988 Olympics = $TC = ΔF_d + ΔF_m$: ₩2.4 trillion

1) Production inducement effect = $ΔTI = ΔTO$: ₩4.3

2) Income inducement effect = $ΔVA$: ₩1.7

3) Employment inducement effect = $ΔL$: 736,000,

where TC = total cost, $F_d$ = final demand for domestic production, $F_m$ = imported final goods, $TI$ = total input, $TO$ = total output, $VA$ = value added, and $L$ = average-working hour jobs lasting a year.

2) The employment effect means an increase in the average-working hour jobs lasting a year. “Average working hours” is less than full-time because some employees work part-time. For example, the former is 80-90% of the latter in the U.S. (USBEA, 2012).

In the case of the 1988 Olympics, roughly 105,000 year-round jobs in average (i.e. $736,000/7$) were expected over a span of seven years. This concept is too elusive for the
a) Leontief matrix for the macroeconomy

\[ \begin{array}{ccc}
\text{Domestic} & \text{Final demand for domestic production} & \text{Total output} \\
\text{Intermediate goods (R_d)} & \text{(F_d)} & \text{(TO)} \\
\downarrow & \downarrow & \downarrow \\
\text{Imported} & \text{Intermediate goods (R_m)} & \\
\text{Value added (VA≡Y)} & \\
\downarrow & \text{Total input (TI)} & \\
\end{array} \]

Note: Imported final goods (F_m) is not shown in the diagram for simplicity’s sake.
Source: Adapted from BOK 2007, p.91; see also USBEA 2012, p.2-5.

b) Relationships in the national accounting

- Total imports: \( M = R_m + F_m \), where \( F_m \) is imported final goods
- Total input: \( TI = R_d + R_m + Y = R_d + F_d = TO \), Total output, where \( Y \) is GDP
- Final demand for domestic production: \( F_d = Y + R_m = VA + R_m \)
- Final demand: \( F_d + F_m = (Y + R_m) + F_m = Y + M = C + I + G + X \) \[ \rightarrow Y \equiv C + I + G + (X - M) \]

c) Multipliers: key macroeconomic effects

- Total cost of hosting the Olympics as an autonomous change in the final demand: \( TC = \Delta F_d + \Delta F_m = \Delta VA + \Delta R_m + \Delta F_m = \Delta VA + \Delta M \)
- Multipliers in response to the change: below in boldface

- \textbf{Leontief multipliers (input–output multipliers)}
  1. Production inducement effect: \( \Delta TI = \Delta TO = \left( \frac{TI}{F_d} \right) \times \Delta F_d \)
  2. Income inducement effect: \( \Delta VA = \left( \frac{VA}{F_d} \right) \times \Delta F_d \)
  3. Employment inducement effect (in person-year): \( \Delta L = \left( \frac{L}{F_d} \right) \times \Delta F_d \), where \( L \) is the national total of year-round jobs to produce \( VA≡Y \)
  4. Import inducement effect: \( \Delta R_m = \left( \frac{R_m}{F_d} \right) \times \Delta F_d \)

- \textbf{Keynesian multiplier}
  5. Autonomous increase in aggregate demand: \( \Delta VA = TC - \Delta M \)
  6. Eventual effect on GDP:
     \( \Delta Y = \left[ \frac{1}{1 - \text{Marginal Propensity to Consume}} \right] \times \Delta VA \)

public to understand. People may incorrectly understand that 736,000 permanent jobs will be newly created. No Korean study explains what the “employment effect” means.
Effects represented by these numbers are spread over seven years from 1982 to 1988. A time span of seven years is the standard for the Olympics (IOC, 2010). There is a similar gap between the host-city selection and the actual event in other mega-events.

In some later studies, consumption spending of foreign (as well as domestic in some cases) visitors at the time of the actual event is added as part of the final demand ($F_d$). This makes only a minor difference in case of sports events which are held over a few weeks. The Keynesian multiplier effect (from an autonomous change in the aggregated demand) is also added on to the final demand in some studies but not in all.

### 2. A Wrong Tool

The economic impact is probably the essence of a feasibility study. Unfortunately, however, each study’s conclusive numbers as shown in TABLE 1 are hardly useful. The reason why the crown jewels of a lengthy report are not helpful is simply because the Leontief matrix is a wrong tool for the purpose of such studies.

**The audience.** Needless to say, the value of a study is defined by its audience. Who is the audience of a feasibility study for a national project such as the Olympics? It is the public in general and those government officials in charge of the ultimate decision making in particular. Then, what they should know first and foremost is a project’s overall costs and benefits to the nation. Simply put, a macroeconomic cost-benefit analysis should be conducted.

The input-output model is of no use for a cost-benefit analysis because it is not designed for that purpose in the first place. As a natural consequence, results from the input-output analysis are not much useful.
There are a few reasons for that.

**Anatomy for physiology.** On the one hand, the Leontief matrix is designed to analyze inter-industry relationships in a national economy. It can be further applied to inter-regional or international industrial relationships. In a word, it is for microscopic analysis of an economy. From the beginning, it is designed to be used by microscopic industrial or regional planners (cf. USBEA, 2012, the title).

On the other hand, the key consideration in deciding whether to host a mega-event is its overall effects on the macroeconomy inasmuch as it takes big money from the central government. In other words, the study focus should be an event’s effects on the overall condition or physiology of the national economy. The Leontief matrix is an anatomy of the national economy, as it were, and accordingly of little use for a macroeconomic decision making about its physiology.

**Machine for an organism.** The Leontief matrix is a closed system. It defines fixed and linear relationships among inputs and outputs. In a word, the matrix is programmed as a machine. This machine is standalone and does not interact with its environment. Outcomes from this machine do not affect such macroeconomic variables as consumption, investment, the interest rate, and the price level which exist outside of the system.

The Olympics is a special event to developing countries or individual regions. The Leontief matrix does not work so well in response to a big change in the final demand because it assumes business as usual where internal relationships remain constant like in a machine.

A national economy is an organism rather than a machine. All parts affect each other. For example, any change in the value added (VA) due to an increase in the final demand (F_d) affects household consumption which means an additional change in the final demand. This is nothing other than the
Keynesian multiplier effect. Moreover, significant investments in particular parts (regions or industries) of the national economy for a mega-event distort the existing internal relationships themselves as defined in the matrix framework. Or, the machine becomes a different one after a major investment and accordingly negates its own use.

**Decade-long outdated data.** The Leontief matrix presupposes a static economy where all the production processes remain constant as defined at a particular point of time. It is basically for short-run studies where constant interrelationships are assumed. Hosting an edition of the Olympics is a decade-long project from the bidding decision to the actual event. Especially in fast-changing countries like Korea, a decade or so is too long a period to assume constant relationships.

To make things worse, the input-output tables are published a few years belatedly because of technical difficulties in data collection. Then, it is inevitable that a feasibility study rely on long-outdated data. The time gap between the data and the event is as much as 15 years in case of the study for the 2018 Winter Olympics (KIET, 2008).

For reasons as explained above, the Leontief matrix is not to be used for feasibility studies for mega-events. As a matter of fact, the two handbooks I quote here (BOK, 2007 and USBEA, 2012) explicate limitations of the Leontief model and warn against its abuse. Korean feasibility studies exactly fit with the description of misuse cases listed in those books.

Additionally, there is a practical problem with the Korean practice. There are big differences in the size of the multipliers among studies. For example, the VA (value added) to TC (total cost) ratio falls somewhere between 39 to 154 percent as illustrated in the column “VA” of TABLE 1. These large gaps among studies, which seem to overshadow technical errors, further reduce credibility of the Leontief matrix to be used for national mega-events.
Beggar-thy-neighbor proposition. For certain events in the U.S. and Australia, inter-regional Leontief matrix is used in estimation of the economic impact on an individual state (Humphreys & Plummer, 1995; NSWT, 1997; Fuller & Clinch, 2000). In those cases, the focus is on small incremental consumption spending from outside of the state rather than significant endogenous investments.

An individual state can benefit from an event and therefore the input-output analysis might be justified from the hosting state’s perspective. However, one state’s windfall gain is likely to represent neighboring states’ foregone opportunities by nature of the inter-regional model (e.g. NSWT, 1997 Dwyer, Forsyth & Spurr, 2005). If so, hosting the Olympics to the benefit of a state becomes a beggar-thy-neighbor proposition for the whole national economy. Accordingly, there may not be much reason for the central government to get involved in such an affair.

Korea’s unique devotion to events. At this point, it should be noted that hosting a mega-event in the U.S. is totally different from the Korean practices. First of all, a state-level cost-benefit analysis in the U.S. is naturally microscopic, rather than macroeconomic, because the federal government is not involved. Moreover, the U.S. norm is that hosting an international event be purely on the commercial consideration (e.g. Andranovich, Burbank & Heying, 2001; Burton, 2003). In principle, an event is privately financed and accordingly minimum category 2 and few category 3 costs are incurred. Practices in other Western countries are similar to the U.S. norm.

The Western norm compares to the particular Korean practice that a special law is enacted for each event by the National Assembly and mandates the central government’s financial supports for large category 2 and 3 costs. Korea’s devotion and commitment to an international event is extraordinary.
A case in point is the 2018 Olympics as shown in TABLE 2 (IOC, 2011). Korea is outstanding among the three candidate cities in the size of investments and a near-unanimity in the public support.

### Table 2: Plans for the 2018 Olympics of the Three Candidate Cities

<table>
<thead>
<tr>
<th>City</th>
<th>Costs (in $ billion)</th>
<th>% of Supportive Opinion in Survey</th>
<th>Opposition Met by IOC Commission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Munich Germany</td>
<td>1.6 1.1 0.7 3.4 60 56</td>
<td>Some local opposition</td>
<td></td>
</tr>
<tr>
<td>Annecy France</td>
<td>1.9 * 1.7 0.9 4.5 51 62</td>
<td>Some local opposition</td>
<td></td>
</tr>
<tr>
<td>Pyeongchang South Korea</td>
<td>1.5 2.3 4.1 7.9 92 87</td>
<td>&quot;No apparent opposition&quot;</td>
<td></td>
</tr>
</tbody>
</table>

* Security cost excluded from the original figure for comparison with the other cities. Source: IOC 2011.

### 3. Forgotten Opportunities

One of the first lessons from Economics 101 is that “cost” means opportunity cost. Unfortunately, however, those feasibility studies have never taken the opportunity costs into account. They do not consider what will happen if Korea invests the same money in improving the national road system or promoting scientific research, for instance. Incidentally, the Leontief matrix is useless in comparing alternatives to each other. It would give precisely the same answer if the budgets for competing projects are distributed across industries in the same manner.

If anyone is to follow Korea’s golden rule, the strategy for a mega-event is simple: the higher the total hosting cost, the more powerful the economic effects. Then, why would Korea not spend hundreds of trillions of won for an event instead of just a few trillions?
It is a truism that other opportunities are not generally considered when one conducts a feasibility study for a planned project. However, the central government, or any policy-maker for that matter, should have implicit and clear priorities in investing limited national resources among competing projects. At any rate, the main point in this paper is that what is common, such as the economic inducement effects here, does not count in the rational decision making and that we can easily come up with other more beneficial investment opportunities, as to be discussed in Section IV.

4. Redundancy of Such “Feasibility Studies”

Economics is all about production and consumption of value or value added. In the national accounting, all that matters is the value of final goods (and services). Intermediate goods are excluded from discussion because their inclusion causes double counting.

**Macroscopic view of the Leontief Matrix.** The *income inducement* is the most meaningful of the three economic-effect numbers because it represents the value added (VA in FIGURE 1-a). The truth of the matter is that a large-scale feasibility study is not necessary to find the VA. We can get VA by subtracting the *imported intermediate goods* ($R_m$) from the final demand for domestic production ($F_d$). In the national accounting, the national income is defined as the total sum of value added. The national income (VA), the national product (Y), and the national spending ($C + I + G + X - M$) are identical (see FIGURE 1-b). In sum, the income inducement effect is nothing more than the fact that *one dollar spent for purely domestic goods will increase one dollar GDP*. That simply is an accounting identity.

Another numeric, the *production inducement* (TI), does not mean much in macroeconomics because it is nothing other than counting intermediate goods.
Its size (TI) vis-à-vis the value added (VA) is solely determined by the technical nature of the production processes. For example, the TI-to-VA ratio becomes exactly 1.00 if there is only one firm in the whole supply chain. It tends to grow as the number of firms in the supply chain increases. To put it differently, TI is greater than the income inducement (VA) only because of multiple counting of intermediate goods.

According to the data from BOK (2007, p.30), the TI-to-VA ratio is 1.7 in the primary industrial sector in 2003 while 3.5 in the secondary industrial sector. This information is simply irrelevant to the audience.

The third number, the employment inducement, is not much useful, either. It simply tells that jobs will increase more or less proportionally to the increase in the GDP. This fact could not be more apparent.

Here, it is notable that more jobs are not required just because TI is larger. On the contrary, there is a high possibility of a reverse trend because the primary sector has a shorter supply chain than the secondary sector while at the same time the former is more labor intensive than the latter. According to the same data from BOK (2007, p.30, 63), the job-to-VA (value added) ratio is 83 jobs per billion won in the primary sector while 15 in the secondary sector. Then, why would anyone of the audience care about TI (total input)?

Real devils in details. Even when the targeted audience were interested, the three numbers can be easily calculated as shown in FIGURE 1-c. For example, the relevant pages in the BOK handbook (2007, p.30, 34, 63) give the three Leontief multipliers (the ratios as defined in the figure) as being 1.8, 0.8, and 18 jobs per billion won respectively. Once the final demand for domestic production ($\Delta F_d$) is estimated, the rest is straightforward.

Often, unnecessary details do more harm than good. In case of the Korean feasibility studies, their details and complexities discourage people from
reading them. Moreover, even three numbers are too many when only one has some meaning. Being confused, some people make a sum of the value added \((\Delta VA)\) and the total output \((\Delta TO = \Delta TI)\), and claim that the result be “the total economic benefit” (which is sheer nonsense, of course) (e.g., \textit{KED}, 2007). Real devils may be in the detail.

\textbf{Construction vs. the macroeconomy.} As shown in the “Total cost” column of Table 1, the construction cost is the biggest of all for a mega-event and shows a large variance from 23 to 98 percent of the total cost. This heavy reliance on a particular industry certainly distorts macroeconomic effects as explained above. For example, the \(TI\)(total input)-to-\(Fd\) (final demand for domestic production) ratio was 1.8 for the macroeconomy and 2.0 for the construction industry in 2003 (BOK, 2007, p.112).\(^3\)

However, a complicated study for more precision may not add any value. First, the cost estimation in any study is extremely rough because of technical difficulties. Moreover, the total cost can significantly vary depending upon the particular (and somewhat arbitrary) decision what types of expenses to include in a study (\textit{cf.} Table 1). Second, a feasibility study on the basis of the Leontief matrix is generally done once and for all for an event possibly because of its complexity. On the contrary, the macroeconomic effects are so simple to calculate that they can be annually updated on the back of the envelope. As a result, estimation errors from the input-output model may easily dwarf any discrepancy from substituting the macroeconomy for the specified industry composition of the total event cost.

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3) The table on the same page erroneously shows a number 1.682 instead of the correct one 1.785 as for the whole economy.
III. The Keynesian Cross

Policy-makers or economists may be tempted to consider the Keynesian multiplier effect from an international event. Politicians often emphasize the economic stimulus from such events (e.g. NSWT, 1997: Economist, 2012a). The RIMS II (Regional Input-Output Modeling System), a popular interregional input-output analysis tool in the U.S., additionally takes the Keynesian multiplier into account (USBEA, 2012; see also Humphreys & Plummer, 1995; Fuller & Clinch, 2000). Some Korean studies reflect the Keynesian multiplier as well.

However, the Keynesian multiplier effect is inapplicable to the mega-events not only because of logical flaws but also of practical limits.

1. Logical Flaws

The Keynesian cross is to explain the macroeconomic stimulus effect of an incremental fiscal outlay in a recession time. It is not applicable in the normal time because of the crowding-out effects. The crowding-out can be explained by the IS-LM, the AS-AD, and the Mundell-Fleming model. All these models are for the short run, less than two years as a rule of thumb (cf. Mankiw, 2012, p.735): the Keynesian cross for the immediate term (ceteris paribus), the IS-LM model for the near term (with variable interest rates), and the AS-AD for the short run (with changeable prices), and the Mundell-Fleming model for a little longer run (with fluctuating exchange rates). The crowding-out effects concurrently or sequentially take place in the loanable funds market (to discourage “I” for investment in macroeconomics), the consumption market (“C” for consumption) and the exports market (“X” for exports).
Hosting the Olympics is typically a long-term project in the normal time. Other international events take similarly long years. Then, the right question should be an event’s impact on the natural level of output in the long run. It is clear from this point alone that the Keynesian cross model is not applicable to an international sports event.

2. Practical Limits

In many studies, the Keynesian multiplier is theoretically argued to be or empirically found to be even smaller than one (1.0) (e.g., IMF, 2008 Feldstein, 2009; Cogan, Cwik & Taylor, 2009; Blanchard & Leigh, 2013; see also Romer & Bernstein, 2009). This means that an incremental fiscal expenditure for a sports event, for instance, increases the national income by even less than the initial outlay. Ilzetzki, Mendoza & Végh (2010) find that the size of the multiplier widely varies depending on situational specifics. It can be as high as 1.6 from government investment in developing countries. Interestingly enough, however, the same can be -0.6 (negative) from government consumption.

Robert Barro, one of the most serious researchers on the fiscal policy, finds that the U.S experience in the four modern wars, WWI, WWII, the Korean War, and the Vietnam War implies a multiplier of 0.6~0.7 (Barro & Redlick, 2009). There is no multiplication at all. On the contrary, there is a “dampener” working there as he calls it (Barro, 2009). He goes even further and suggests the multiplier is close to zero in normal times. Or, an incremental government spending is mostly offset by a decrease in the private expenditure.

Much research has been done specifically on the stimulus effect of hosting mega-events or building giant sports facilities as well (e.g. Baade & Matheson, 2001, 2002; Matheson, 2006, 2009; see also NSWT, 1997; Dwyer
et al., 2005). The general conclusion is that hosting an event for the purpose of *economic* benefits does not make much sense.

All in all, the economic impact of hosting the Olympics cannot be justified by the Leontief matrix or the Keynesian cross. They are wrong tools to apply in the first place.

**IV. The Right Way: A Holistic Cost-Benefit Analysis**

Resources are limited by definition. Any economic entity including the national government tries to put the limited resources to their best uses. One can do this by choosing the best value of all available alternatives. The value of each alternative is calculated through a cost-benefit analysis. This is equivalent to taking all available opportunities into account.

This paper is not a good place to discuss the cost-benefit analysis in detail. Just for the purpose of illustration, I compare three hypothetical investment opportunities for three trillion Korean won each (see TABLE 3):

1) Construction of ten football stadia for the World Cup,
2) The Keynesian proposition of *digging ditches and refilling them*,
3) Construction of an offshore port platform near Incheon.

First of all, there is no particular reason why these three projects may be substantially different in economic effects as estimated by the golden rule: the production inducement, the income inducement, and the employment inducement. Only differences, if any, are from technicalities in the industrial supply chains, cement vs. steel for example. Second of all, the Keynesian multiplier effect, large or small, will most probably be similar among the three alternatives. The size of this multiplier does not have much to do with industrial technicalities to be specified by the Leontief matrix. These
commonalities do not count in comparing alternatives.

<table>
<thead>
<tr>
<th>(Table 3) Cost-Benefit of Three Hypothetical National Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project</strong></td>
</tr>
<tr>
<td>Alternative 1: Construction of ten custom-made World Cup football stadia</td>
</tr>
<tr>
<td>Alternative 2: The Keynesian proposition: digging ditches and refilling them</td>
</tr>
<tr>
<td>Alternative 3: Construction of an offshore port platform near Incheon</td>
</tr>
</tbody>
</table>

Assumptions and remarks

1) *Similar multiplier effects*, Leontief or Keynesian, from the three alternatives
2) *Alternative 1: Residual value of football stadia*. Custom-made stadia are rarely used for football plays. Each one takes 3 billion won annually for maintenance over many decades to come. The real discount rate is 3% PA. (Expected expenses are almost risk-free.)
3) *Alternative 2: Digging ditches and refilling them*. A wasteland is developed into residential, commercial or industrial sites.
4) *Alternative 3: To build an offshore deep-sea port platform near Incheon*. The city of Incheon is ideal as a Northeast Asian hub of maritime logistics in terms of its geopolitical location but cannot become one only because of shallowness of its front sea. An offshore port will easily solve this more or less technical problem.

Then, any meaningful differences are from the long-run productivity of the three investment opportunities. What will the productivity of ten football stadia be? They might not have many uses inasmuch as they are custom-prepared for the World Cup. Then, few benefits are expected from ten empty stadia. Worse, they need maintenance in order not to become haunting places. Referring to data from Korea’s National Assembly Budget Office (KCTI, 2012, pp.112-3), we may reasonably assume that each stadium takes three billion won as the annual maintenance expense. Further assuming that the
real discount rate is 3% PA and that stadia last many decades to come, we end up with a negative net present value of roughly one trillion won from the ten stadia.4)

The second alternative was originally proposed as a countercyclical measure (cf. Keynes, 1936, pp.129-30). Nevertheless, what long-term benefits can we expect from it? It depends upon the type of land to “dig and refill.” If a wasteland is developed into building sites through the process, the net value creation could be enormous.

The third alternative can be invaluable in light that Korea’s competitiveness in transoceanic logistics might have been less affected by a similar platform near Shanghai (Yangshan Port) if Korea had constructed one circa the 2002 World Cup.

Then, it is apparent what from the three alternatives the Korean government has to choose first as far as the economic consideration is concerned.

**Possible investment alternatives in Korea.** In this paper, I do not intend to claim that most other government projects will be more beneficial than the Olympic Games. I simply mean that many alternatives which are economically better than the Olympics are easily identifiable.

Above, I give rather simplistic examples as alternatives to hosting the Olympics. When it comes to more productive national projects than the

4) The organizing committee of an event runs its own book, but its financial performance (surplus or deficit) is rarely an issue in the economic impact study because of its small size. Accordingly, I exclude consequences of the committee activities. Some World Cup stadia in Korea claim to have made profits in post-event uses, but most revenues are from other uses than football games. These stadia took additional investments to accommodate different uses. Accordingly, costs and benefits for other uses are out of question here.

Similar to the Korean case, facilities in Athens take €20 million per annum without any significant revenues therefrom (*FT*, 2004b see also Zimbalist, 2010). The Olympic stadium with 90,000 seats in Sydney takes $30 million a year to operate (Zimbalist, 2010).
Olympics, few economics or policy-makers would have difficulty in naming some: promotion of basic scientific research, lifting the national fertility rate, renovating elementary school facilities, industrialization of agriculture, prevention of possible blackouts due to energy shortage, developing environment-friendly energy sources, “enhancing the welfare level of the military personnel” (President Park Geun-hye in December 2013), and so on. Otherwise, the government can slow down snowballing of the public debt by transferring the Olympics expenses to some other urgent uses.

V. Lessons from Past Events in the World

In this section, I review academic literature and news reports on sports events in the world to doublecheck potential gains and pitfalls from hosting a sports mega-event. I also refer to the Korean experience where applicable.

As opposed to the general belief in Korea, most Western sports economists are doubtful of benefits from mega-events (see Sanderson, 2000 for an overview). Common findings from various studies are: economic benefits are exaggerated; costs are understated, and; most of the extra-economic benefits are elusive.

1. Cost Overruns

Flyvbjerg & Stewart (2012) review 17 editions of Olympics (out of a total of 28) from 1960 to 2012 for which the relevant cost data are available. In the study, they cover only the direct costs, classified as category 1 and 2, and conclude as follows:

1) Every edition of the Games, without a single exception, has experienced
a cost overrun.

2) The average overrun is by 179% in the real term and 324% in the nominal term.

The implication of their study is clear: the candidate city or country is to expect that the actual cost will be three times (279%) in the real terms or four times (424%) in the nominal terms as big as the initial estimation. Flyvbjerg & Stewart (2012) exclude the 1988 Seoul Olympics in their study due to a lack of data. They suspect such data unavailability is because “no one asked how well the budgets held for these games” (p.9).

2. Wide Variance in Indirect Investment Costs

After the 2008 Beijing Olympics, the Chinese government boasted it was a “money-saving” event with a total expenditure of RMB19 billion and a surplus of RMB1 billion (CNAO, 2009). However, they did not account for the indirect investment costs (category 3) which may be as much as $40 billion (Matheson, 2008; WSJ, 2008). In some countries, these indirect costs have put the hosting city or country in a serious financial trouble. The 1976 Games left Montreal a debt of $2.8 billion, which took the city three decades to repay (Zimbalist, 2010). A total purse of more than $16 billion for the 2004 Olympics contributed to the Greek government’s fiscal bankruptcy in 2010 (Flyvbjerg & Stewart, 2012).

The organizing committee of the 1988 Seoul Olympics announced that the net surplus was 252 billion won. However, they did not account for two trillion won of direct or indirect investment costs. The total of the category 1, 2, and 3 costs for the 2018 Pyeongchang is estimated to be 6.2 trillion won (KIET, 2008) or 9.2 (HRI, 2011). The total cost may turn out to be a lot bigger than those if history is any guide.
3. Hidden Costs

On top of the explicit costs, the host country as a whole pays various hidden costs. The bidding process which starts a decade in advance is costly. All the process up to the preparation of the Candidature File takes money, time and efforts. In case of the failed bid for the 2016 Olympics, Chicago incurred an estimated cost of $100 million (Zimbalist, 2010; Baade & Sanderson, 2011). Corruption scandals in the selection process, so frequently reported, imply that some bidding cities pay out a large sum of unofficial costs as well (Baade & Matheson, 2002; WSJ, 2010).

The security cost around the event period is also big. In case of the 2004 Athens, it was estimated to be higher than €1.5 billion (FT, 2004a; Matheson, 2006). Treating IOC officials and their families from the beginning to the end is notoriously expensive (Burton, 2003).

In developing countries like China, the private sector has to bear significant costs (e.g., Matheson, 2006; BW, 2008; NYT, 2008; Economist, 2012b). Often, national campaigns are made to prettify streets, public facilities and private buildings. Factories are closed down during the event. For example, China’s heavy-industry production was declined substantially around the 2008 Olympics because of the pollution control (GS, 2012).

Korea also pays a significant amount of hidden costs. Its bidding process is very special with a full support of the government, the business, and the people (Davis, 2007). A large number of business people and volunteers are mobilized to help administer all the process from the bid to the actual event (e.g., Chonrabukdo, 1997; KAWGOC, 1999; Cho & Baimer, 2012). Around the event, numerous restrictions were imposed on human activities including eviction of local residents (in the past), shortened working hours, and the alternate-day driving system (recently). For example, an official report tells
that 13,063 street vendors, 2,860 ill-positioned heaps of various things, and 69,668 ugly sign boards were removed from the urban areas before the 1986 Asian games (KMCST, 2012, p.76).

**Opportunity cost of the national attention.** Probably the single greatest investment of Korea in an international event is the attention of the government. The bidding process itself is a national venture (e.g., WSJ, 2011a, d) and “successfully hosting the event” after a win becomes one of the most important national agendas over seven years (e.g., KMOFE, 2002; KMCST, 2011; KMOSF, 2012). The executive attention is arguably the single scarcest resource in the business administration as so much leadership literature implies. The same principle should apply to the public sector as well: the attention of the central government headed by the president may be an incomparably scarce resource.

4. Potential Indirect Benefits

Hosting cities in the world also cite other indirect benefits, tangible or intangible, immediate or afterwards from a mega-event.

**Tourism revenues.** Many feasibility studies predict a large number of foreigners will visit the hosting country to see the event. Contrary to the general expectation, however, the number of visitors did not substantially change or rather decreased around a mega-event in many reported cases (e.g., Andranovich et al., 2001; Szymanski, 2002; GS, 2012; WSJ, 2012). Tourists may avoid a busy city in a special event (crowding-out effect). They may simply change their visiting time (switching effect) (e.g. Preuss, 2011).

**Legacy benefits.** An international sports event certainly helps enhance the name recognition of the hosting city and the country all over the world. However, such name recognition does not necessarily contribute to increases
in tourism to or exports from the country.

A one-time event may not have any significant effects in the first place. If anything, effects are short-lived as people’s memory of an event fades away rather quickly (Andranovich et al., 2001; Matheson, 2008; Zimbalist, 2010). Rose & Spiegel (2009) find that hosting an event is correlated to a permanent increase by 30 percent in international trade. Interestingly enough, they also discover that failed bids have a similar effect as well. However, the causality is the reverse in both cases as they themselves conclude: “bidding for the Olympics is a costly policy signal that is followed by future liberalization” (p.28). In addition, they are intrigued by some “countries that submit repeated or multiple bids for large sporting events” (p.29).

**National prestige.** The popular press in other countries rarely claims that an international event helps improve the image of their nation (e.g., Cho & Bairner, 2012). The Koreans seem to be unique in their belief about the national prestige. At any rate, the effect on the national image is defined by what the world population observes in the country, not by the simple fact that it hosts a mega-event. The overall effect may well be negative depending on the situation (Andranovich et al., 2001; Matheson, 2006; Zimbalist, 2010).

According to a national survey in October 1988 in Korea, 87% of respondents felt proud of the 1988 Olympics and 91% thought Korea’s national status had been upgraded by it (KDI, 1989). However, Westerners’ impressions about Korea from the 1988 Olympics or the 2002 World Cup were not necessarily favorable to Korea (e.g., Cumings, 1997; BW, 2002; NYT, 2002, 2010). Some even called the Korean people’s attitudes chauvinistic and obsessed with gold medals (Buruma, 1988).

**Festivity.** People are excited in the midst of a big event. Such excitement is expected to increase with the size of the event. Kavetsos and Szymanski (2010) find that Europeans feel good about hosting international sports events
in their own country but that such effect does not last long.

The Koreans are special in this regard as well. The vast majority of Koreans could not be more exhilarated at the time of the 1988 Olympics and the 2002 World Cup. All the Korean popular press boasted country-wide excitement and an *emotionally unified nation* (*cf.* Davis, 2007). There seems to be no question that the Koreans feel happy with hosting an international sports event. That is even more so because the host country effect has enhanced the medal count by 54% in average through the Olympic history (GS, 2012).

5. Instrument for a national drive

Cities, regions or countries sometimes plan to have an event as a way of mobilizing resources to develop a particular area. For example, a senior South African official explains that the 2010 World Cup was an effective opportunity to “focus” on and to set a “deadline” for renovating or building urgently needed social overhead capital (Wharton, 2011).

The 1988 Seoul Olympics is known to have been politically motivated by the military government (*e.g.*, Davis, 2007). It certainly helped expedite construction of some roads including the “88 Olympic Highway.” Ironically, the particular event left an unintended consequence, *democratization of the nation*. University of Chicago historian Cumings (1997) comments, “It is also doubtful that Roh Tae Woo would have made the dramatic announcement about direct elections on June 29, 1987, had the Olympics not been pending” (pp.332-3).

There are a few problems in utilizing a mega-event as an instrument for a national initiative. First, this implies the government is politically coward. Second, political drives tend to be made without a sincere cost-benefit
6. Extravagant Feast

In the vast majority of past events, the total cost of all types was larger than expected while the total benefit of all kinds smaller. Moreover, the cost has been increasing because “[t]here is a growing tendency for Candidate Cities to try to go above and beyond IOC requirements in the bid” (IOC, 2011, p.6).

On the basis of discussions so far, winning an Olympics bid may not be a wise proposition (e.g. Baade & Matheson, 2002) but for the feel-good effect. Put differently, the Olympic Games *in my own country can be just a hyper-expensive nation-wide party*. The Olympics as a festivity may or may not be worthwhile depending upon the preference of the majority of the hosting country’s people.

VI. Concluding Remarks

Various Korean research institutes have been conducting feasibility studies in the wrong way about economic benefits from hosting the Olympic Games, the World Cup, and the Expo. Their common tool, the Leontief input-output model, is simply a wrong one to be applied to a macroeconomic cost-benefit analysis. In a word, the Korean practice is similar to using a microscope in observation of the constellation. As a result of inappropriate feasibility studies, national resources may possibly have been inefficiently allocated over decades.
The Keynesian fiscal multiplier model cannot be applied, either. Keynes himself warned against misuses of his model. He clarifies in his epoch-making book, “Thus public works even of doubtful utility may pay for themselves over and over again at a time of severe unemployment…... but they may become a more doubtful proposition as a state of full employment is approached” (1936, p.127). Probably because of the general misunderstanding of his proposition by his contemporary thought leaders, he said coming out of a gathering with influential Americans, “I was the only non-Keynesian there” (FT, 2009).

Korea has not been in a chronic recession. On the contrary, the country agonizes over shortfalls in its fiscal budget. As well reported in the popular press, there have been serious fights among various constituencies for bigger budgets year after year at the National Assembly. Then, the Keynesian cross is inapplicable to economic effects of a fiscal expenditure.

In the place of the Keynesian cross or the Leontief matrix, a comprehensive cost-benefit analysis should be conducted for any major public investment. Using this right approach, one can easily find, without an in-depth analysis, more productive as well as more urgent national investment opportunities than hosting the Olympics.

In elementary economics, two principles are clear: nothing good comes for free, and; rational people maximize their net benefit by choosing the best alternative through a holistic cost-benefit analysis. Then, why have the Koreans not been following such basic principles of economics when it comes to bidding for an international event? That is probably because policy-makers have not seriously concerned about the cost side of such events.

The 1988 Olympics may be justified in light of the Korean people’s emotional depression throughout their long history. It may have been “the coming-out party on the miracle of the Han” (Cumings, 1997, p.332). But,
such a rationale is not to be applied to the future events. To refer to another economic principle, all that matters in decision making is the marginal benefit or cost. The marginal benefit from an additional international event might be small simply because Korea has already hosted many of them. This is because the marginal benefit from hosting an event has been declining due to still another economic principle the law of diminishing returns. Korea may have passed the point where the marginal benefit from a mega-event is the same as its marginal cost.

Economic insensibility notwithstanding, Korea’s continuous interest in hosting mega-events may be justified as a matter of the Korean life-style. There could be invisible or unquantifiable benefits including burnishing the national image, enhancing people’s pride, and feel-good or energizing effects. At any rate, however, the true picture of the costs and benefits (in the economic sense) should be known to the public. The government, sports associations or research institutes may not refer to the economic inducement effects as the prime rationale for hosting the Olympics.

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한국 사례의 종합 검토

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논문초록

“88 올림픽” 이후 한국은 2018년까지 모두 13개의 대규모 국제행사를 개최하게 된다. 행사를 유치할 때는 국책연구소의 타당성보고서가 근거로 제시된다. 보고서에는 “국외 선양” 등의 경제외적 편익도 언급되지만, 총산출액, GDP, 고용의 증대라는 세 가지 숫자로 집약되는 이른바 “경제적 유발효과”가 핵심이 된다. 이 숫자는 레온티에프 투입산출표에서 계산된 것인데, 우선 그 모델을 적용하는 것은 방법론상으로 큰 잘못이다. 왜냐하면 대규모 국가투자의 효과는 국가차원에서 본비용편익의 분석에 따라야지 산업, 지역간 영향이라는 미시분석에 의존할 일이 아니기 때문이다. 더구나 “유발 효과”라는 것은 축구장이나 스키 슬로프의 건설뿐만 아니라, 도로 향연의 건설 등 어느 투자에도 당연히 따르는 것이며, 그럼에도 불구하고 각급 체육회 및 지자체는 물론 정부까지 올림픽 등의 개최가 마치 “국제행사에만 고유한 엄청난 경제적 은전(恩典)”인 것처럼 홍보한다. 그럼에도 불구하고 각종 체육회 및 지자체는 물론 정부까지 올림픽 등의 개최가 마치 “국제행사에만 고유한 엄청난 경제적 은전(恩典)”인 것처럼 홍보한다. 그럼에도 불구하고 각종 체육회 및 지자체는 물론 정부까지 올림픽 등의 개최가 마치 “국제행사에만 고유한 엄청난 경제적 은전(恩典)”인 것처럼 홍보한다. 만약 하나, 냉정한 비용편익 분석의 결과가 “경제효과 측면에서 부(負)”라면 한국은 지금까지 상당한 자원을 낭비한 것이 된다. 그러고 그러할 만한 개념은 매우 높다. 예컨대 “대체로 비어 있는 10개의 축구장”과 같은 돈을 투자하여 확장한 인천항만”의 실제적 경제효과는 비교 자체가 불가능하기 때문이다. 이 논문은 다른 이유라던가 토대로 “경제적 유발효과”를 근거로 국제행사를 유치하고 또 그렇게 시민을 설득하는 것은 잘못이라는 점을 지적한다.

핵심 주제어: 국제 스포츠 행사, 올림픽 개최, 경제적 유발효과, 레온티에프 투입산출표
JEL 주제분류: C67, E65, H54

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