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Assessing the Economic Impact of the Proposed Aerotropolis Legislation

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EXECUTIVE SUMMARY

This essay discusses the costs and benefits of the proposed Aerotropolis tax credit legislation currently before the Missouri legislature. The main purpose is to provide a methodology for evaluating whether state tax credits and direct export subsidies are warranted in this case. In order to do so, I first review the traditional arguments for state intervention in a market economy. With the potential exception of so-called agglomeration externalities, the traditional arguments for state subsidization are found irrelevant with respect to the Aerotropolis project. Simply stated, there seemingly exists no market failure on which one may justify government intervention in support of an Aerotropolis at Lambert-St. Louis International Airport (Lambert).

Second, I briefly summarize the methodology used to analyze the effects of public-sector market interventions. This methodology, named cost-benefit analysis, is generally accepted in academic literature and mandated by the federal government for many federally-funded projects. Based on this short review, I have concluded that it is very unlikely that Aerotropolis would need public subsidies. Given the absence of well-identified market failures it follows that if Aerotropolis were a project involving government subsidies it would also be a project that private markets would be willing to finance without subsidies, provided there is an economic justification for the project in the first place.

Third, I focus specifically on the costs and benefits of the Aerotropolis subsidies by means of two simple theoretical models. Aerotropolis subsidies come in two varieties: direct export subsidies and warehouse development subsidies. The direct export subsidies would most likely be captured by exporting firms that would use Lambert as a shipping hub. Given Lambert's location, the benefits of these subsidies would significantly spill over into regions outside Missouri. In fact, some of these benefits would likely accrue to foreign consumers of the exported goods. The warehouse development subsidies, on the other hand, would directly benefit the current owners of land neighboring Lambert or otherwise qualifying for special tax credit treatment, with likely spillover effects showering the local construction industry.

The lack of careful studies addressing the

economic impact of the proposed legislation exposes one very surprising aspect of the Aerotropolis discussion. While a few very rudimentary calculations on job creation and economic output have been presented, no serious cost-benefit analyses have been reported. This essay explains why job creation and output impact estimates are not the right way to evaluate policy interventions like Aerotropolis, even if we take their numbers at face value.

Finally, I quickly review the economic agglomeration rationale for the Aerotropolis subsidies. Because agglomeration effects are hard to quantify and hard evidence supporting same is missing, I leave this topic as an open question for consideration.

INTRODUCTION

The current Aerotropolis bill before the Missouri legislature would grant up to $300 million of subsidies for warehouse-space development and $60 million for freight forwarders who direct air cargo flights from Lambert.[i] The warehouse subsidies would also be available to large-scale warehouse developments within a 50-mile radius of Lambert. The primary goal of the legislation, proponents say, is to increase trade between China and the Midwest and to capture the economic benefits of that trade through increased economic activity around Lambert.[ii] These tax credit subsidies would need to be authorized within the next decade.[iii] Several sources, including Spalding and Ishmael (2011) and RCGA (2011), offer a detailed explanation of the proposed project.

Given the significant public expenditure involved, it is truly amazing to consider how few economic analyses have been presented to justify state involvement. This essay discusses the methods that should be used to analyze state involvement in a project such as Aerotropolis, reviews the only existing publicly available economic impact study, and assesses the potential winners and losers arising from the proposed legislation. A brief review of economic agglomeration is also included, as this presents the sole potential justification for public involvement in the Aerotropolis project.

SOME BACKGROUND ON GOVERNMENT INTERVENTIONS IN MARKET ECONOMIES

It is an indisputable fact that federal, state, and local governments intervene in market economies in the United States. A pure market economy exists only in Economics 101 classrooms and textbooks. In the real world, markets are influenced by regulations, taxation, subsidies, the public provision of goods, and a plethora of additional government incursions. When economists analyze these government interventions, they typically first begin by reference to baseline assumptions giving rise to a perfectly functioning competitive economy absent government intervention. Under certain idealized conditions, this baseline scenario is known to maximize the well-being of society. If we accept as a simplifying assumption that the government's primary objective is to maximize societal well-being, then market interventions by government are not justified unless deviations from this baseline exist or when concerns arise regarding the distributional fairness of market outcomes.

The economic concept that perfectly competitive markets maximize societal well-being is by no means uncontroversial, but it is a useful starting point in order to avoid the more ideological discussion of individual rights in the face of government interference. It is safe to assume that if this so-called utilitarian or consequentialist analysis would not justify a large-scale government intervention, then a rights-based approach would certainly not justify that same intervention.

With the potential exception of so-called agglomeration externalities, the traditional arguments for state subsidization are found irrelevant with respect to the Aerotropolis project. Simply stated, there seemingly exists no market failure on which one may justify government intervention in support of an Aerotropolis at Lambert-St. Louis International Airport (Lambert).

To be perfectly candid, it is difficult if not impossible to identify a market failure that supports the interventions envisioned in the Aerotropolis legislation.

Economists identify the following concepts (or market failures), the presence of which violates the conditions that are necessary to the existence of a perfectly competitive market and the maximization of societal well-being:

- *Market power:* When at least one market participant can use its influence to make the market price deviate from what would have been the competitive outcome. This participant could be a firm, a group of firms, or a labor union.
- *Externalities:* When actions taken by market participants affect the well-being of other persons by means that are outside the functioning of the price mechanism. Examples include pollution and knowledge generation. This influence can be from firm behavior (e.g., noise pollution from a plant) or individual behavior (e.g., cigarette smoke causing discomfort for people around a smoker). Externalities can be either negative (e.g., pollution) or positive (e.g., knowledge creation).
- *Public goods:* A public good is a good that is (nearly) non-rival and non-excludable in consumption. A non-rival good is a good where one's ability to consume the good is not diminished by decisions made by others to consume the same good: it has to be produced only once (e.g., radio/television broadcasts). A non-excludable good is one where the provider has no way of controlling who consumes the good (e.g., non-scrambled radio/television broadcasts). Classic examples of public goods are lighthouses and national defense.
- *Information asymmetry:* One of the key assumptions of perfect competition is that all market participants have the same information about the goods and services being traded. If one of the participants knows more than the others (e.g., you might know that the used car you are trying to sell is a lemon), markets would typically fail to achieve an efficient outcome. Information asymmetry is an important concept when analyzing financial and insurance markets.

Because the existence of one or more prevents markets from maximizing well-being, these failures are often cited in support of government intervention into the economy. In addition, many government interventions directly address distributional goals — that is, programs that shift resources from one group of people to another group of people — despite the absence of market failures. This last justification is obviously very controversial with no general consensus existing on how much weight should be given to distributional concerns.

In the past 15 years or so, in light of mounting evidence of non-rational decision-making by many consumers, a paternalistic justification for intervention has arisen wherein the government seeks to prevent or undo the effects of bad consumer choices, for example the choice to consume harmful drugs (the so-called behavioral economics justification). Finally, some would justify government interventions by reference to fiscal externalities, or to the effects of targeted interventions on the government's overall budget (an example is eminent domain used to increase government tax revenues).

It is perhaps instructive to look at some government interventions and to compare them with the possible justifications for those interventions:

Table 1: Some justifications for public interventions discussed in modern economics literature.

PROGRAM	JUSTIFICATIONS
Social Security	Distributional concerns, informational asymmetries in insurance markets, behavioral economics issues
Medicare/Medicaid, Health Care Markets	All the reasons for Social Security + externality issues, informational problems in health service production
Transportation networks: roads, ports, airports	Public goods
Education	Distributional concerns, informational problems in financing private educational investments, fiscal externalities of educational investment
Unemployment Insurance	Distributional concerns, informational problems
National Defense	Public goods
Soda taxes	Behavioral economics issues, fiscal externalities
Environmental policy	Externalities

My goal here is not to justify the specific interventions listed above, but to make clear that in most instances of substantial federal, state, or local intervention a plausible case for the presence of a market failure has been established in the academic literature. The question here is whether such a case even exists with respect to Aerotropolis.

To be perfectly candid, it is difficult if not impossible to identify a market failure that supports the interventions envisioned in the Aerotropolis legislation. Specifically, the legislation does not address any of the traditional market failures, including public goods, externalities, informational asymmetries, or market power.

Nor does there seem to be a strong distributional justification for the intervention. In the absence of a *bona fide* market failure, the right policy response to the Aerotropolis question is: warehousing and transportation costs should be financed through private markets without public subsidies.

Nevertheless, the "infant industry" concept may be advanced in support of the Aerotropolis subsidy. The infant industry idea poses that the public sector can facilitate new economic activity by subsidizing it in its beginning. While traditionally viewed negatively by the economics profession, new research on economic agglomeration has resulted in increased academic respect for the infant-industry argument, at least in principle.[iv] Economic agglomeration refers to the clustering (using the term popularized by Michael Porter in his 1990

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book "Competitive Advantage of Nations") of economic activity into specific locations, which generate externalities that enhance productivity.[v] The best known example of such a cluster is the high-tech industry in Silicon Valley.[vi] Lacking a clearly identified market failure, the economic case for Aerotropolis must be made, if at all, on the basis of agglomeration effects. I review the case for agglomeration effects at the end of this essay. The conclusion of that review is that while it is possible that a project like Aerotropolis would involve some agglomeration externalities, our current knowledge on how large those externalities would be is too limited to warrant a large-scale government intervention.

BASIC PRINCIPLES OF GOVERNMENT COST-BENEFIT ANALYSIS AND THE AEROTROPOLIS LEGISLATION

Next, I briefly review the accepted framework for analyzing public sector interventions in market economies. This framework is known as cost-benefit analysis. Cost-benefit analysis is accepted by academics and endorsed by the federal government (by mandating it in many instances) and the World Bank.[vii]

Private Sector Investments

Before considering cost-benefit analysis, however, it will prove instructive to first consider a textbook case scenario for private sector investment analysis.

A firm's owner must decide whether to invest in a project. Projects often have both initial investment and future operating costs. After the initial investment, the project generates revenues each year with a salvage/resale value at the end of the investment's time horizon.

This scenario is a gross, albeit pedagogical, oversimplification of the issues facing a real-world decision maker. Many issues related to both uncertainty about costs, revenues, and even the future regulatory environment may make the decision maker's calculation more complicated. The possibility of delaying an investment until the decision maker knows more about the uncertain variables or the possibility of varying the size of the project also complicate significantly the real analysis that has to be undertaken to justify the investment.

Keeping these caveats in mind, a private sector firm trying to maximize its profits and returns to owners should use a very simple rule in deciding whether to invest or not. This is known as the net present value rule, which states that investments that have a positive net present value should be undertaken. A net present value of an investment is calculated by summing the expected project revenues and costs, discounting each to present value using an appropriate risk-adjusted interest rate, then subtracting present value costs from present value revenues.

Cost-Benefit Analysis

Cost-benefit analysis can be a powerful tool for analyzing the desirability of public interventions in market economies. The simplest form of cost-benefit analysis described below is best justified when the overall project is relatively small compared to the overall economy and distributional concerns are not very important in judging the merits of the program. Extensions to large economy-wide projects (such as comprehensive tax reform) and distributional considerations are in principle straightforward but often in practice fairly complex when complicated interactions between multiple markets need to be modeled carefully.

Cost-benefit analysis in practice may be explained as follows. Start with a public-sector project. The project can be anything, including developing a vaccination program, building bridges, funding special education, or even implementing the Aerotropolis

proposal. The basic principle is the same as that of the private sector investment: All costs and benefits should be summed then reduced to present value. If the project has a positive net present value then it should be undertaken.

Because the costs and benefits of government projects often lack well-defined market prices, cost-benefit analyses of public projects often differ from private-sector net present value analyses. Some traditional examples of these hard-to-monetize benefits include the value of reductions in commuting times or the value of the beneficial effects of public health expenditures. The academic discipline of cost-benefit analysis deals largely (but not exclusively) with this problem by using prices in calculations that reflect real economic costs and benefits. A standard book-length introduction to cost-benefit analysis may be found at Boardman *et al* (2005). Standard public economics textbooks such as Gruber (2004) and Rosen and Gayer (2008) also provide chapter-length introductions to this topic.

In order to fix ideas, let us first assume that Aerotropolis does not happen without public subsidies. A traditional cost-benefit-analysis would sum all public and private expenditures on the cost side. On the benefit side, the market value of the services produced by the Aerotropolis project would be calculated. If the risk-adjusted net present value of the project is positive, then the public intervention would be justified. All this sounds pretty simple, but in reality one would need to take into account several complicating considerations, both practical and theoretical.

First, all estimates of both costs and benefits would include significant uncertainty. Thus, a proper analysis would include statistical estimations of both the costs and benefits, but subject to estimation and specification errors. Undertaking such calculations are by no means trivial projects. In my estimation, a large-scale cost-benefit analysis of a project such as Aerotropolis would require several months of full-time work by a team of experts (economists and transportation/logistics professionals).

Second, one must consider whether the counterfactual of no Aerotropolis investment without state subsidies is the right counterfactual. I am not in a position to speculate whether private investment into export-related warehousing would occur without the subsidies. Before one can answer whether public sector involvement is needed, it would be absolutely crucial first to know what would happen in the absence of public involvement. Because of the absence of identifiable market failures, the Aerotropolis project should be an endeavor that the private sector would be willing to finance provided that a proper evaluation would find that the project satisfies the positive net-benefits threshold. In this case, the cost-benefit calculation would be approximately the same as the private sector investment rule. Because none of its potential benefits or costs are difficult to monetize, it seems that the Aerotropolis legislation does not address any easily identifiable market failures.

The above statement about the desirability of public involvement should be taken at least with the following caveats:

1. It is somewhat likely that a large-scale project like Aerotropolis needs some degree of public-private partnership to assist with many administrative issues, including those related to environmental regulations and land use regulations. This need is very different from the need for large-scale public subsidies.

2. One of the basic assumptions of cost-benefit analysis is that all the resources in the economy are fully employed. The political motivation for the Aerotropolis project, in part, is job creation. Should Aerotropolis create jobs for involuntarily unemployed individuals, then counting the labor expenditures as costs in the

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cost-benefit analysis would not be entirely correct. How large an adjustment should be made for this is hard to quantify and would depend on the distribution of the new jobs among the employed and unemployed workforce.

3. The efficiency cost of government fund raising: One very basic result of traditional public finance is that government revenues come with an efficiency cost. This is because taxes drive a wedge between the price that a buyer pays and the price a seller receives. The basic reason for the efficiency cost is the principle that once government taxes an activity there will be less of that activity in society. While no general consensus on this "marginal cost of public funds" (MCPF) exists, typical estimates are in the 1.1-1.65 range (table 15-9, p. 429, Boardman *et al*, 2005). This means that if the marginal cost of public funds is 1.4 then the benefits of a new public project should exceed the cost by 40 percent for an entirely publicly-funded project. In the case of a partially publicly-subsidized project like Aerotropolis, the public expenditure part should be multiplied by the MCPF factor.

Note that while the second point would be an argument in favor of public subsidies, the third one is an argument against public subsidies. This means that the proper public-sector decision rule about subsidies would deviate from the private-sector net-present-value rule by the net effect of these two forces. In my opinion, it is very likely that the third factor dominates the second and that there is no conclusive argument for public subsidies based solely on these two considerations.

Considering the size and scale of the proposed Aerotropolis subsidies, the absence of publicly available cost-benefit analyses is truly amazing. An economic impact study commissioned by the RCGA (2011) exists, but it falls far short of a proper cost-benefit analysis. This study will be discussed later in this essay.

INCIDENCE QUESTIONS: WHO ARE THE WINNERS AND LOSERS FROM THESE SUBSIDIES?

A traditional cost-benefit analysis is typically silent on the distributional issues. Distributional issues can have many dimensions, like the allocation of costs and benefits across the income distribution. This is not likely the most relevant distributional question when analyzing Aerotropolis. What is very relevant, however, is that while the fiscal burden of the subsidies fall squarely on the residents of one state (namely Missouri), the benefits of the subsidies will likely be more dispersed. In this short section, I will try to address the potential incidence of the Aerotropolis subsidies. This discussion draws heavily on two simple theoretical partial equilibrium models, both of which are sketched in the appendix to this essay. How Missouri's legislators and voters should value economic benefits accruing outside Missouri is a normative question.

The point is this: it is very likely that some of the benefits of the public subsidies will be captured by residents or firms in neighboring states and by foreign consumers of the exported goods. The overall assessment of the desirability of Aerotropolis subsidies is further complicated by the fact that the proposed hub, if successful, would not only generate new shipping activity but will further reshuffle shipping activity among airports in the United States, thereby creating losses in economic activity for regions outside Missouri.

Incidence of export subsidies:

The proposed Air Export Tax Credits could be captured by the businesses providing shipping services at Lambert, the producers of the goods being shipped, or the buyers of the goods being shipped. In section one of the appendix, I explain this by reference to a simple spatial equilibrium model.

This model shows that the final beneficiaries

of the Air Export Tax Credits would be the firms exporting through Lambert. Given Lambert's location, it is very likely that many of the exporters will be from the neighboring states. It is also possible that some of the benefits will accrue to foreign consumers, but to quantify that effect we would need more detailed econometric analysis of the demand for the exports.

Incidence of the Aerotropolis real estate tax credits

The warehouse development tax credits are the largest component of the proposed Aerotropolis legislation. The legislation provides tax credits for the development of warehouse facilities in new developments of 100 acres or more in a 50 mile radius around Lambert (or in smaller areas if those areas are special economic zones), in areas within the boundaries of the airport, or in areas owned by a port authority.[viii] In section two of the appendix I argue that most of the benefits from these subsidies will accrue to the current owners of the land neighboring Lambert.

ECONOMIC IMPACT ANALYSIS BY THE RCGA: MAGICAL MULTIPLIERS AT WORK

The Saint Louis Regional Chamber and Growth Association (RCGA) recently published its calculations showing the economic impact of the Aerotropolis program.[ix] These calculations produce staggering numbers, including a total combined output increase over 15 years valued at $21.88 billion. These staggering numbers are compared to the cost of the legislation ($300 million, or less than two percent of the total output increase). There are several mistakes being committed making this comparison, even if we take the RCGA numbers at face value.

The first problem with a calculation like this is the assumption that the generated activity is new economic activity that does not replace existing economic activity. This assumption is necessary to justify comparing the direct fiscal cost with the increased output. The underlying economic assumption seems to imply an enormous lack of aggregate demand and an abundance of unemployed labor having exactly the skills needed for the Aerotropolis project and unused capital resources ready to be employed in the construction of Aerotropolis. Furthermore, this kind of analysis seems to assume that a demand boost generated by a project like Aerotropolis puts these resources into productive use. While it is arguably true that some labor resources (due to involuntary unemployment) are not being used in our current economy, the assumption that a project like Aerotropolis would only use resources that are otherwise not employed is clearly wrong. Most of the resources that would be employed following the implementation of the Aerotropolis legislation would have been used in some alternative way, while most of the spending by Aerotropolis-created workers would happen anyway even had the project not been undertaken. Under the faulty logic of a multiplier analysis like the one presented by the RCGA, almost any public investment can be justified. The basic message here is simple yet specious: any spending is good, regardless of the actual benefits generated by such spending. Paraphrasing the famous quip by Lord John Maynard Keynes (Keynes 1936), according to this logic we might as well be paying people to dig holes and fill those same holes. One could very easily produce a multiplier analysis showing it being a very desirable public activity.

Another problem with the RCGA's analysis is the implicit idea that we should be comparing the $300 million tax-credit expenditure with the $21.88 billion output increase. If a $300 million tax subsidy to Aerotropolis can generate a 70-fold increase in output, then in a similar way, funding this $300 million expenditure with other taxes

None of the purported benefits of Aerotropolis seem hard to capture by the private sector, so the basic logic of government intervention seems non-existent.

Because the costs and benefits of government projects often lack well-defined market prices, cost-benefit analyses of public projects often differ from private-sector net present value analyses.

or expenditure cuts must also have similar multiplier effects. While I think the whole idea of measuring a net benefits project through a rudimentary calculation like that is flawed because of the "idle resources" assumption needed to justify it, I am sure a consulting firm can be found that is willing to show a $300 million tax increase/expenditure having a multiplier effect to the tune of many billions of dollars or even in the $21.88 billion ball park if needed. The job creation numbers cited in the RCGA's report are subject to the same criticisms as the economic value added numbers. Although that given current unemployment figures it would be very desirable to create jobs in Missouri, it is highly unlikely that the jobs created under Aerotropolis will be "new jobs." This is due to both the logical problems with the "idle resources" assumption used to justify the economic impact analysis and the fact that the cost of financing the subsidies by tax credits will take resources away in a distortive manner from other parts of the Missouri economy.

AGGLOMERATION AND INDUSTRIAL POLICY

A potential case for a public-sector intervention can be made arguing that Aerotropolis is likely to generate agglomeration externalities. Agglomeration externalities have been intensively studied in theoretical economic models over the past three decades. Book-length treatments of this topic include Glaeser (2008) and Fujita and Thisse (2002). A recent World Development Report chapter (2009) by the World Bank summarizes the research on this topic. An agglomeration externality occurs when a production activity generates localized public knowledge or other localized benefits for other firms in the vicinity of the production activity. A concrete example of an agglomeration externality in action is the hypothetical informal information exchange between Google and Apple employees in Silicon Valley. This exchange makes the employees more productive in their respective firms. Similarly, having many financial intermediation service firms headquartered in the City of London may provide mutual benefits by means of their proximity. From a purely positive or descriptive perspective it seems to be that agglomeration into large productive urban areas is an important contributor to the overall economic growth of the world.

Empirical studies of agglomeration economies currently come in (mostly) two forms. The direct approach measures agglomeration effects using firm level data. The second, more indirect approach, looks at the geographical patterns of industrial activity to see if the predictions of agglomeration theory hold in the data. The direct approach gives us quantitative measures of agglomeration effects. The good news about the literature is that it finds significant and often large knowledge and agglomeration externalities in industries studied. The bad news is that these studies seem to concentrate entirely on research and development (R&D) activities using either R&D investment or measures like patent counts as measures of knowledge input and output. Basic economic textbook theory would suggest that R&D activities should exhibit strong externalities. Hence the generalization of these findings to much lower knowledge-intensity activity like shipping is unknown. Another point of emphasis in the direct empirical agglomeration-externality literature is that while knowledge externalities are clearly present, the question of how important is the role of proximity (agglomeration) has complicated patterns (e.g Orlando 2004 and Autant-Bernard 2011).

Using the indirect approach, it has been possible to study a larger set of industries. While anecdotally it seems self-evident that geographical patterns of economic activity are not random, the evidence on the role of

agglomeration is mixed. Alecke *et al* (2006) finds that the locations of high-tech industry firms in Germany do not seem to follow the patterns predicted by agglomeration theory. More importantly, these indirect studies cannot give direct estimates of the magnitude of agglomeration externalities, and non-random patterns of economic activity can happen for non-agglomeration reasons. For example, most agricultural activity happens where the land is arable. An estimation of the magnitude of the agglomeration effects would be necessary for a well-argued policy intervention case.

The case for subsidizing agglomeration effects rests on the idea that the resulting benefits, whether through information exchange or through other means, must occur outside ordinary market processes. It is conceivable that a concentration of China-related know-how, or in general export shipping related know-how, in and around Lambert may generate agglomeration effects. This conceivable probability is different from a hard, bankable certainty. And even if these agglomeration effects were to be generated, they would have to be very strong to counterbalance the negative impacts of the inefficient tax financing needed to finance the subsidies and the spillover effects when the benefits cross state lines (the latter being relevant if we examine the issue from the perspective of Missourians only).

Furthermore, the very real possibility of competing subsidies being offered by other state governments should be taken into account. Competing subsidies would have the potential to lead into a situation where public funds are being wasted in multiple states to generate agglomeration externalities that fail to occur anywhere. This kind of subsidy competition would be a lose-lose situation for all state governments involved.

Unfortunately, our current knowledge of agglomeration effects is such that while the empirical academic literature supports the existence of these effects, often there is no magic pill in the literature regarding how to create agglomeration benefits through public policy. While proponents of public-sector investments like Aerotropolis can cite successful cases of public involvement in producing clusters of economic activity, several attempts to replicate known successes have failed. The absence of numerous other success stories such as Silicon Valley, the London Financial Center, and the Mumbay Film Industry speaks mostly to the difficulty of achieving these kinds of agglomeration benefits through public policy. If it only took targeted investments by well-meaning politicians, surely these highly productive clusters would not be the exception but the rule.

CONCLUSIONS

The main conclusions in this essay are two-fold. First, the economic effects of the proposed Aerotropolis legislation have not been sufficiently addressed in the debate. No serious studies exist and this essay is only a preliminary starting point, providing some basic concepts on how such studies should be undertaken. More fundamentally, the solid economic case for a public-sector subsidy for Aerotropolis has not been made. None of the purported benefits of Aerotropolis seem hard to capture by the private sector, so the basic logic of government intervention seems non-existent. While it is true that a case could be made based on agglomeration effects, our current state of knowledge on those effects seems to suggest that an active government intervention that picks the industry for agglomeration is as likely to fail as it is to succeed.

The warehouse development tax credits are the largest component of the proposed Aerotropolis legislation.

Considering the size and scale of the proposed Aerotropolis subsidies, the absence of publicly available cost-benefit analyses is truly amazing.

APPENDIX

In this appendix I present two stylized models that address the tax incidences of the proposed Aerotropolis legislation.

1. A model to analyze the effects of the direct shipping subsidy component.

This model (see Figure 1) borrows heavily from Wrede (2009). Wrede uses a similar model to analyze the optimal taxation in a situation where residents choose between two locations to work. The classical references to thinking about economic policy in spatial contexts like this are Fujita (1989) and Krugman (1991). Assume that our model economy is presented by the [0,1] segment of the real line. Location 0 corresponds to Lambert Airport and location 1 corresponds to a competing international shipping location representing all competing shipping options (O'Hare, Kansas City Airport, etc). This simple geometry of the model could be extended to more realistic spatial representations without changing any of the conclusions below.

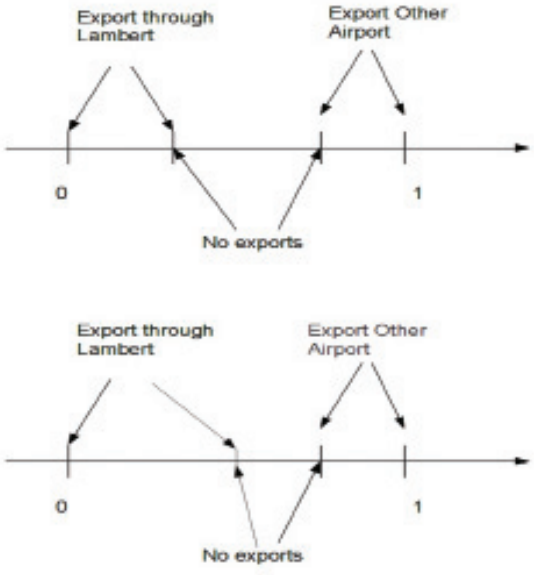
At each location there is a potential exporter producing an exportable output of 1 unit. This output can be sold in the world market at price 1 and in the domestic (or local) market at price p. Export-shipping costs at locations 0 and 1 are assumed to be c and it is assumed that in both locations there are enough competing shippers to keep shipping competitive. The cost of shipping the goods from the respective production location to the airport is assumed to be *d*distance to the airport.*

This model economy has three possible equilibriums when shipping subsidies are not present. Which equilibrium is relevant will depend on the cost parameter values as follows:

1) If $1-c<p$, all goods are sold at the local domestic market.

2) If $1-c>p>1-c-d/2$, then some goods are exported and there is a threshold distance x (satisfying $p=1-c-d*x$) such that all the ships produced at intervals $[0,x]$ (through Lambert) and $[1-x,x]$ (through competing airport) are exported.

Figure 1
Graphical analysis of the model moving from the no-subsidy scenario 2 (top panel) to the subsidy scenario 2a (bottom panel)



3) If *1-c-d/2>p*, then all goods are exported, half through Lambert and half through the other airport.

Now, if we introduce shipping subsidies at rate *s* at Lambert we can analyze what happens in each of the three cases. In the first two undisturbed equilibrium two distinct responses to the subsidies are possible.

1a) If *1-c+s<p*, all goods are still sold at the local domestic market, the subsidies go unused.

1b) If *1-c+s>p*, then some firms will decide it is worthwhile to export through Lambert (up to location *x*, such that *1-c+s-d*x=p)*. Firms in locations *l<x* (closer to Lambert than the critical location) will see their profits increase from *p* to *1-c+s-d*l*. The subsidy is partially captured by the producers and partially consumed by increased total transportation costs in the economy.

2a) If *1-c-1/2*d+1/2*s<p*, then firms up to location *y*, where *1-c-d*y+s=p*, will ship through Lambert. Firms in locations between *[y,1-x]*, where x is defined in scenario 2 of the undisturbed equilibrium, will sell in the domestic market, and firms from locations *[1-x,1]* will export through the alternative airport. As in scenario 1b), the whole subsidy is captured by the producers shipping through Lambert and by the increase of the total transportation costs throughout the economy.

2b) If *1-c-1/2*d+1/2*s<p*, then firms from locations *[0,1/2*(1+s/d)]* will export through Lambert and all the other firms will export through the alternative airport. As in scenario 1b) and 2a), the entire subsidy is captured by the producers shipping through Lambert and by the increase in the total transportation costs in the economy.

3) Identical to 2b).

This stylized model highlights what I believe to be the main incidence consequence of the shipping subsidy: the shipping subsidy will benefit the (non-marginal) exporters exporting through Lambert airport. From the perspective of a Missouri taxpayer, it is very likely that these subsidies end up benefiting producers in neighboring states in addition to potential Missouri exporters.

The conclusion of this stylized model could be slightly altered by assuming that the demand for the goods produced in the world market is not perfectly elastic, the production is not fixed, or that the sellers have some market power in selling their goods in the world market. These alternative assumptions would mean that some of the final beneficiaries of the shipping subsidies would be the foreign consumers in addition to the exporting firms.

It should also be noted that the model is a short or intermediate run model. In a long run model the location of the production activity would respond to subsidies. If the subsidies were permanent, then this would only make the conclusion about the incidence of subsidies stronger, as firms would move closer to Lambert. However, given the limited duration of the proposed subsidies, this is unlikely to be a very relevant adjustment margin and hence the intermediate run model is most likely to give the appropriate answer to the incidence question.

Under the faulty logic of a multiplier analysis like the one presented by the RCGA, almost any public investment can be justified.

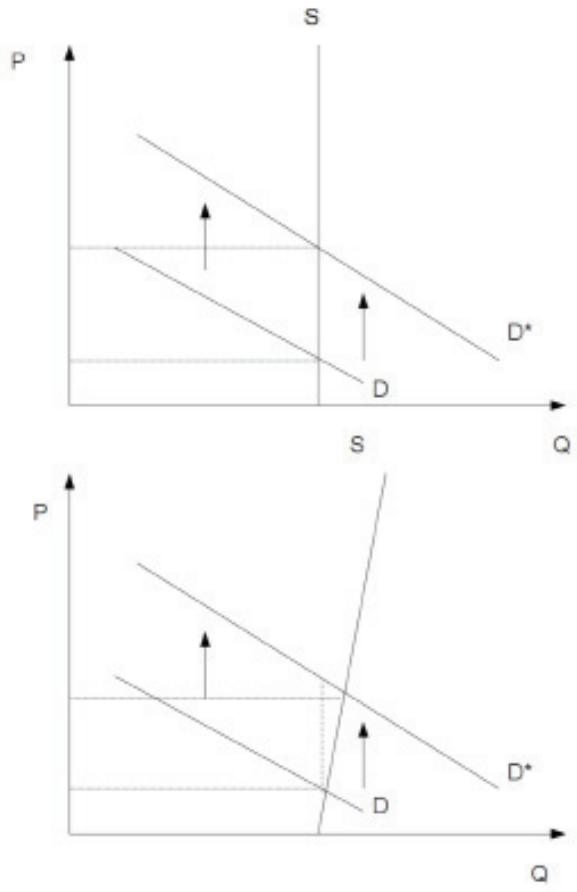
A potential case for a public-sector intervention can be made arguing that Aerotropolis is likely to generate agglomeration externalities.

2. A model to analyze the effects of the warehouse construction subsidies (see Figure 2).

The subsidy analysis would be straight out of an intermediate microeconomics textbook such as Pindick and Rubinfeld or a public economics textbook such as Gruber if the warehouse subsidies were limited to the areas directly adjacent to Lambert Airport. But two caveats apply. First, these textbooks typically analyze taxes, not subsidies. But subsidies are merely negative taxes. Second, given that the subsidy is for a restricted use it is possible that the demand curve for land does not move up by the full amount of the target expenditure per unit of land. The lesson from these analyses is very straightforward: the true economic beneficiaries of these subsidies are the current owners of the land near Lambert via the increase in the value of their land. This is nothing but an administratively complicated version of tax incidence with a vertical supply curve. The analysis is presented in the upper panel of Figure 2.

Taking into account the second subsidy-eligible group changes the analysis slightly. This group provides a competitive fringe of subsidy-eligible land and hence makes the supply curve slightly more elastic. This shifts the intermediate incidence of these subsidies slightly from the land owners towards the operators of the warehouse/ shipping facilities. This analysis is presented

Figure 2
Subsidy incidence with perfectly inelastic supply (top panel) and almost perfectly inelastic supply (bottom panel). The price on the Y-axis is the market price of land eligible for subsidies. The pre-subsidy demand curve for land is depicted by D and the post-subsidy demand curve is depicted by D. The supply is depicted by S. The intersection of these curves indicates the market clearing price and the supply of land.*



in the lower panel of Figure 2. Given the restriction on the size of the alternative eligible locations, it is very likely that this effect is small. It is also very likely that the intermediate incidence is the final incidence of these tax subsidies, since given the nature of these subsidies they are very unlikely to affect the marginal cost of shipping. Hence these subsidies are unlikely to benefit the producers of the shipped goods or the final foreign consumers of these goods, unlike the direct shipping subsidies.

It is interesting to think a little about the second caveat mentioned above. This caveat addresses the possibility that the demand curve for land does not shift up by the full amount of the per-unit-of-land subsidy expenditure. This reflects the very real possibility that without subsidies all this new development would not happen and some of the subsidy-eligible land would remain in non-export-shipping related use. This is very likely given the depressed state of the warehousing market around Lambert and in the Greater St. Louis area in general (Spalding and Ishmael, 2011). While Figure 2 would still provide an accurate analysis of the incidence as far as land markets are concerned, there would be additional beneficiaries for the Aerotropolis subsidies.

The potential added warehouse construction would mean that some benefits would accrue to the construction industry.

The simple model presented here has addressed the partial equilibrium incidence of the proposed subsidy. One general equilibrium effect is very likely to be relevant. The current owners of non-elegible warehouse space in Saint Louis are likely to lose from the proposed subsidies. Unless the agglomeration effects of Aerotropolis are so large they overwhelm the direct effect of subsidizing competing suppliers, the value of the non-eligible warehouse-space decreases. The magnitude of this effect would require a careful econometric analysis that is beyond the scope of this study.

REFERENCES

Alecke, B., C. Alsleben, F. Scharr, and G. Untiedt. 2006. "Are there really high-tech clusters? The geographic concentration of German manufacturing industries and its determinants." *The Annals of Regional Science* Vol. 40 Issue 1.

Autant-Bernard, C., and J. P. LeSage. 2011. "Quantifying knowledge spillovers using spatial econometrics models." *Journal of Regional Science* 51: 471–496.

Boardman, A., D. Greenberg, A. Vinning, and D. Weimer. 2005. *Cost-Benefit Analysis: Concepts and Practice*. Prentice Hall.

Fuguitt, D., and S. Wilcox. 1999. *Cost-Benefit Analysis for Public Sector Decision Makers*, Quorum Books.

Fujita, M. 1989. *Urban Economic Theory: Land Use and City Size*. Cambridge University Press.

Fujita, M., and J-F Thisse. 2002. *Economics of Agglomeration – Cities, Industrial Location and Regional Growth*. Cambridge University Press.

Glaeser, Edward. 2008. *Cities, Agglomeration, and Spatial Equilibrium*. Oxford University Press.

Gruber, Jonathan. 2004. *Public Finance and Public Policy*. Worth Publishers.

Keynes, J.M. 1936. *The General Theory of Employment, Interest and Money*. Cambridge University Press.

Krugman, Paul. 1991. "Increasing Returns and Economic Geography." *Journal of Political Economy* Vol. 99 No. 3.

Orlando, M. 2004. "Measuring Spillovers from Industrial R&D: On the Importance of Geographic and Technological Proximity." *The RAND Journal of Economics* Vol. 34 Issue 5.

Pindyck S., and D. Rubinfeld. 2008. *Microeconomics*. Prentice-Hall.

The case for subsidizing agglomeration effects rests on the idea that the resulting benefits, whether through information exchange or through other means, must occur outside ordinary market processes.

Porter, Michael. 1990. *Competitive Advantage of Nations*. The Free Press.

RCGA. 2011. *Estimate of Potential Economic Impact Associated with "Aerotropolis" Leglislation and an International Freight Hub at Lambert-St. Louis International Airport*. St. Louis Regional Chamber and Growth Association.

Rodriguez-Clare, Andres. 2007. "Clusters and Comparative Advantage: Implications for Industrial Policy." *Journal of Development Economics* 82:43-57.

Rodrik, Dani. 2007. "Normalizing Industrial Policy." Commission on Growth and Development Working Paper #3.

Rosen, S., and T. Gayer. 2008. *Public Finance*. McGraw-Hill Irwin.

Spalding, A., and P. Ishmael. 2011. "'Aerotropolis': A Raw Deal for Missouri." Show-Me Institute Case Study Number 9.

World Bank. 2009. "Scale Economies and Agglomeration." *World Development Report* Chap. 4.

Wrede, Matthias. 2009. "A Distortive Wage Tax and a Countervailing Commuting Subsidy." J*ournal of Public Economic Theory* 11.297 – 310.

NOTES

i Fall 2011 Special Session legislation draft, as provided by Jason Zamkus, staff attorney for Sen. Eric Schmitt, sections 135.1500 to 135.1521.

ii Rosenbaum, Jason, "China hub debate moves to Jefferson City." *St. Louis Beacon*. http://www.stlbeacon.org/issues-politics/176-Missouri_Issues/109262-debate-over-china-hub-moves-to-jefferson-city.

iii According to the draft of the special session legislation made available in early August 2011, the warehouse tax credits would need to be authorized by Aug. 28, 2020. The freight forwarder tax credits would need to be authorized by August 28, 2019.

iv Dani Rodrik (2007) reviews recent academic studies evidence on infant industry subsidization.

v See Rodriguez-Clare (2007) for a recent critical discussion of these arguments.

vi Glaeser, Edward, "Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier," pp. 68-79, The Penguin Press, New York. 2011.

vii Fugitt and Wilcox, 1999, Chapter 1.

viii Draft of special session legislation, as provided by Jason Zamkus to Sen. Eric Schmitt on July 20, 2011. Section 135.1500 (17)

ix These calculations were done by Princeton-based firm Biggins Lacy Shapiro (BLS). The RCGA study is available at: http://www.scribd.com/doc/54066457/St-Louis-RCGA-Aerotropolis-Economic-Impact-Estimate.

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