Industrial Subsidies and the Politics of World Trade: The Case of the Boeing 7e7

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ABSTRACT

This paper offers a critical commentary on the launch process for a large commercial aircraft (LCA). Using the Boeing 7e7 as an example, we argue that the contemporary launch process bears little resemblance to previous practices. Specifically, the launch process involves both domestic and foreign subsidies because US production is now organized under a 'systems integration' basis. Under systems integration, the lead company (Boeing) spreads risk across a network of suppliers and production partners. Although final assembly takes place inside the US, much of the value-added is shared across the production network (as much as 70 percent). This has clear implications for US trade and employment, in that international subcontracting boosts foreign imports and reduces the need for domestic production workers. From a trade perspective, however, a potentially more troubling feature of the launch process is that major public subsidies are involved. While some of these subsidies are permitted under the World Trade Organization's (WTO) subsidy rules (e.g., certain types of pre-production R&D support), other types of subsidies clearly violate the WTO's regulations (e.g., infrastructure and production subsidies). This paper reviews the types of subsidies that Boeing has sought in the planning process for the 7e7 launch. Our evidence suggests that Boeing's launch process contravenes existing international agreements on production subsidies. This does not bode well for the US commercial aerospace sector, especially in light of Boeing's urgent need for a new aircraft program to compete with Airbus.

INTRODUCTION

The commercial aerospace sector is a critical part of the US industrial base in terms of skilled production jobs, applied research, foreign exports, and inter-industry multiplier effects (US International Trade Commission, 2001). With the rise of Airbus, however, the sole remaining US producer of large passenger jets (Boeing) has opted for a 'systems integration' mode of production to reduce unit costs, simplify assembly procedures, and speed up the product development process (MacPherson and Pritchard, 2003). Under systems integration, risk and costs are spread across a network of domestic and foreign partners. While the final product is assembled inside the US, major parts of the airframe are subcontracted to foreign suppliers. In the past, international outsourcing was guided in large part by industrial offset agreements that provided guaranteed sales for new aircraft. Today, however, the costs associated with launching a new aircraft in the large commercial aircraft (LCA) category are so high that systems integration based on cost-minimization makes good financial sense -- at least over the short-run. A disadvantage of systems integration is that outsourcing production also implies 'outsourcing profit' (Hart-Smith, 1998). A further disadvantage is that core technology must be transferred to outside suppliers in order to make the final assembly task feasible (Pritchard, 2001).

From a trade and employment perspective, systems integration on a global basis implies increased US imports and reduced domestic labor demand. If Japan were to make the wings for Boeing's proposed 7e7 'Dreamliner', then presumably Boeing would not need to retain skilled production workers that currently have expertise in wing milling and fabrication. This said, a potentially more serious concern from a trade perspective is that a new LCA launch by Boeing would likely proceed on the basis of substantial public subsidies (both foreign and domestic). Domestic subsidies could range from state-level incentives to encourage assembly-based investments to indirect national subsidies for the production process. Foreign subsidies might follow precisely the same lines for parts production in offshore locations. This raises the question of whether a new LCA launch by Boeing might contravene the World Trade Organization's (WTO) rules regarding 'subsidies and countervailing measures'. A litigation by the WTO would surely alarm potential customers (airlines), as well as add extra complexity to the launch process.

Set against this context, this paper reviews the planning process that has thus far been developed to set the stage for a 7e7 launch. The arguments advanced in our analysis are not dependent upon whether or not Boeing decides to launch this aircraft. Nor does our analysis hinge upon the precise distribution of production or assembly locations inside or outside the United States. Rather, the analysis simply uses the 7e7 as an example of how the launch process could be derailed or delayed by international regulatory conditions (i.e., WTO litigations). Further, it should be stressed that our paper does not purport to make any contributions to current or emerging theories of international business, economic geography, or industrial organization. Instead, our goal is to characterize the launch process for a new LCA in light of a number of fundamental changes that have recently taken place within the US aerospace sector. Prior to an examination of the subsidy issue, however, it is first necessary to supply a research context for the discussion. Why has Boeing opted for a systems integration mode of production? What are the advantages and disadvantages of this type of business model? And, what does systems integration imply for US employment and trade?

SYSTEMS INTEGRATION

Total systems integration can be described as a vertically disintegrated business model where a single firm assembles a final product from components or subsystems manufactured by external suppliers (Yip, 2003). While few industrial corporations have adopted total systems integration as a business strategy, many firms have an approach that comes fairly close. In the US LCA sector, for instance, Boeing has become increasingly dependent upon outside suppliers for technologically complex and/or critical airframe components such as wings, fuselage assemblies, centre wing boxes, and tail sections (Pritchard, 2001). A major goal of this strategy is to reduce unit costs, especially when the non-recurring expenditures associated with component design and development can be transferred to external suppliers. To be successful at this, it is imperative that all components and subsystems interface smoothly so that final assembly can be reduced to the task of slotting or joining various bits and pieces together. Clearly, this requires a substantial amount of design and engineering coordination across the supply network to ensure problem-free interface between components.

In this regard, Kash and Rycoft (2000) note that the successful commercialization of complex technologies increasingly requires firms to operate within self-organizing networks. Systems integrators build these networks by selecting technologically competent partners that exhibit advanced industrial design capability. The systems integrator can spread commercial risk across the supply chain by sharing revenues on the basis of final sales. The economic logic behind this model is analogous to the principle of international comparative advantage, in that corporate welfare as a whole is deemed to be maximized when each business unit specializes in the production of items that best exploit internal competencies in terms of design, engineering, or manufacturing capability. While Boeing has increasingly adopted this business philosophy to cut launch costs for new aircraft programs, not all of the world's major aerospace companies have opted for this model. In the case of Rolls Royce jet engines, for example, Prencipe (1997) notes that complex or core technologies remain internally rooted with respect to design, development, and production activity, whereas peripheral or less critical functions are outsourced on a systems integration basis. Significantly, Prencipe (1997) shows that Rolls Royce has retained a total design capability across virtually all of the component fields that have recently been hived-off to outside suppliers. In the case of Airbus, moreover, it is interesting to note that complex or critical airframe components are produced internally (especially for newer aircraft models), and that outsourcing mainly takes place for models that are nearing the end of their life-cycles (Pritchard, 2001).

Whether or not vertical integration (e.g., Airbus) is strategically superior to systems integration (e.g., Boeing) is an issue that goes beyond the scope of this paper. There are, however, several potential drawbacks to systems integration that warrant brief mention. First, systems integration can lead to the hollowing-out of firm-specific technological knowledge and production experience (see Becker and Zirpoli, 2003). If the systems integrator fails to retain in-house competence in key areas of component production (e.g., via shadow engineering), then the firm can lose its ability to master the evolutionary dynamics of the product-system (Prencipe, 1997, 2000). While hollowing-out for financial reasons may serve the interests of shareholders, Prencipe (2000) notes that such a strategy can at the same time lead to a serious loss of important engineering skills, learning economies, and technological independence (see also Tyson, 1992). In a similar vein, Paoli (1995) points out that spinning out component production ultimately entails spinning out cognitive activities, in that the systems integrator must transfer both codified and tacit knowledge to external suppliers. The possibility that risk-sharing partners could eventually become competitors does not appear to figure prominently in the financial calculus of systems integrators (see MacPherson and Pritchard, 2003). In the case of the 7e7, it should be emphasized that the most innovative segments of the product-system are slated for Japan and Italy (i.e. composite wing and fuselage sections). While the estimated 3-7 days of final work at Boeing's Everett plant near Seattle (WA) may entail the development of new assembly procedures, the real innovation in the 7e7 program revolves around the development of new composite structures outside the United States.

Another potential problem with systems integration is that the separate minimization of individual costs can prevent the minimization of total costs whenever individual costs interact with other costs. For example, Hart-Smith (1998) shows that cutting costs on any given set of components can in some cases lead to higher than expected total costs as a result of unforeseen interface difficulties. In short, a business strategy that is driven by the need for unit cost reduction at the component level can lead to a wide range of adverse consequences. In this regard, the unusually high level of systems integration proposed for the 7e7 is something that the LCA sector has never seen before.

TRENDS IN US LCA PRODUCTION

The commercial aircraft industry has been an evolution of technologies for the past fifty years. A new product launch rarely represents a technological breakthrough or geopolitical change, but the proposed 7e7 comes remarkably close. Traditionally, the US commercial air-framers would launch comparable models within a few years of each other (e.g., the DC-9 versus the Boeing 737). These models would have similar if not identical manufacturing processes, the same domestic and foreign subcontractors, and similar selling tactics. The US commercial aircraft manufacturers dominated the world with over 90% of global market share in the 1960s for aircraft with over 100 seats. During the past 25 years international subcontracting of subassemblies has become more prevalent with Boeing and the ex-McDonnell Douglas, but the US prime contractors were always in control of the design, manufacturing procedures, and core technologies of 1,000s of first, second and third tier suppliers. An increasingly common practice for Boeing was to boost international cooperation for new LCA launches to secure foreign customers (Eriksson, 1995). While the work content moved away from the US, this industrial offset approach did have advantages for Boeing in reducing capital expenditures for tooling, equipment, and facility infrastructure. However, core technological knowledge always resided within the company. Boeing had the engineering and management experience to develop and control the manufacturing processes for new programs, as well as coordinate a vast supplier base to successfully launch new products.

Today, Boeing is no longer the number one LCA manufacturer in the world. Airbus holds that prestigious position in every measurable category, including new orders, backlogs, deliveries, product technology, and advanced manufacturing procedures. Boeing enjoyed more than a 70% market share after the company purchased McDonnell Douglas in the mid 1990s (Commission of the Future of the US Aerospace Industry, 2002). This share has now fallen below 50%, and the company faces serious problems with aging product lines (i.e., average aircraft design vintages of 28 years).

Table 1 shows that Boeing's commercial product line has 5 out of the 6 aircraft currently in production with technologies dating back to the 1960s and 1970s (only the 777 has new technologies from the 1990s). The aging Boeing commercial aircraft family has not sold well during the current industry downturn, which has Boeing's production numbers slashed from 620 aircraft deliveries in 1999 to only 280 in 2003. The backlog numbers for 4 of the 6 aircraft models are dangerously low, which causes alarm for the airlines regarding the longevity of each model in making their future fleet acquisition decisions. The announced closing of the 757 production lines in October 2003 has exasperated this concern.

Boeing has been diversifying away from the commercial side of the aerospace business since the launch of the 777 in the early 1990s (commercial sales dropped below 50% of total revenues in 2002). The company has been moving into defense sectors with purchases of several high-technology firms in the 1990s (e.g. Rockwell). Boeing also has a future vision to become an aviation services provider in fields such as engine repair, aircraft maintenance, flight crew training, used airplane remarketing, and airport and route services (see MacPherson and Pritchard, 2003). The probability of the 7e7 actually being launched can be debated by the visible lack of new investment in the commercial product line over the past 8 years, along with the risk averting attitude of the current Boeing Board of Directors (many of whom are averse to investing billions of dollars into a new airplane launch to service a mature market segment that only yields a 2-5% profit margin). This has the industry questioning Boeing's appetite to compete against Airbus, a company with a growing stable of newer aircraft that feature advanced technologies. With the resignation of Boeing's longstanding CEO (Phil Condit) on December 1, 2003, moreover, many Boeing employees fear that the company's new CEO (Harry Stonecipher) will continue to position the firm within high-margin fields outside the commercial aerospace domain (e.g., defense applications, aviation services, telecommunications).

This said, the 7e7 proposed by Boeing will be looking to change or "break" the rules on how a new aircraft is launched by redefining where the work elements will be done, as well as changing the methods of funding not only for product development but also the production process itself (disregarding the company's traditional methods of assembling). One might consider this as "clean sheet of paper approach" for Boeing, which needs a radically new strategy to compete with Airbus. In several important respects, however, Boeing is disregarding the "rules" of engagement for the commercial aircraft world. One of those rules pertains to the 1992 US/EU Agreement on Trade in Large Civil Aircraft, while the other pertains to the 1994 WTO Agreement on Subsidies and Countervailing Measures.

Table 1. *Boeing Airframe Product Life Cycle by Model*

Model	Year of Introduction	Last Year Ordered	Years in Market	Orders in Backlog 6/30/03	Total Orders @ 6/30/03	% of Orders Cumulative 6/30/03
707*	1955	1990	35	0	1010	0%
727*	1960	1983	23	0	1831	0%
737	1965	2003	38	809	5273	15%
747	1966	2003	37	43	1372	3%
757	1978	2003	25	18	1049	2%
767	1978	2003	25	31	939	3%
777	1990	2003	13	179	622	29%
DC-8*	1955	1971	16	0	556	0%
DC-9/MD80/MD90/717	1963	2003	40	36	2438	1%
DC-10/MD11*	1968	1998	30	0	646	0%
Totals				1116	15736	7%
Average Airframe Product Life			28.20			
Average Active Airframe Product Life			29.67			

1992 US-EU AGREEMENT ON TRADE IN LARGE CIVIL AIRCRAFT

This agreement clarifies and expands the application of a WTO plurilateral agreement, the Agreement on Trade in Civil Aircraft with passenger aircraft of 100 seats or more (GATT, 1979; U.S. Department of Commerce's Office of Aerospace, 2003). The agreement is aimed at minimizing the trade-distorting role governments may play in the LCA sector by:

- Article 3 prohibiting government funding for the production of large civil aircraft:

  The agreement benefits companies by prohibiting the parties from providing any government funds for the production of large civil aircraft and limiting government support for the development of new, large civil aircraft programs (US-EU Trade in Large Civil Aircraft, 1992).

- Article 4 establishing limits on the percent of government funds that may be provided for the development of new, large civil aircraft:

  The agreement limits direct *government support for the development of new aircraft programs to no more than 33 percent of a new aircraft program's total development costs. Funds provided to manufacturers must be repaid at rates at least equivalent to the cost of government borrowing (US-EU Trade in Large Civil Aircraft, 1992).*

- Article 5 limiting the benefits that manufacturers of large civil aircraft may receive from "indirect" government support, such as from performing government-funded aeronautical research and development:

  The identifiable benefits to manufacturers of large civil aircraft from indirect *government support is also limited. Indirect government support includes activities such as government-funded aeronautical research and development, which can reduce a manufacturer's cost in producing aircraft. The U.S.-EU aircraft agreement stipulates that the identifiable benefits from indirect government support are not to exceed (a) 3 percent of total large civil aircraft industry's annual turnover, and (b) 4% percent of the annual turnover of any single manufacturer of large civil aircraft (US-EU Trade in Large Civil Aircraft, 1992).*

The US-EU aircraft agreement was signed and took effect on July 17, 1992. Either party may withdraw from the agreement, provided notification of its intention to do so is issued one year in advance. If the proposed 7e7 development and production package proceeds according to plan, however, then it seems likely that the U.S. may need to withdraw from the 1992 agreement.

WTO–AGREEMENT ON SUBSIDIES AND COUNTERVAILING MEASURES

The Agreement on Subsidies and Countervailing Measures (SCM Agreement) addresses two separate but related topics: multilateral disciplines regulating the provision of subsidies, and the use of countervailing measures to offset injury caused by subsidized imports. Multilateral disciplines are the rules regarding whether or not a subsidy may be provided by a Member (WTO, 2003A). They are enforced through invocation of the WTO dispute settlement mechanism. Countervailing duties are unilateral instruments which may be applied by a Member after an investigation by that Member and a determination that the criteria set forth in the SCM Agreement are satisfied.

The WTO SCM Agreement contains a definition of the term "subsidy". The definition contains three basic elements: (i) a financial contribution (ii) by a government or any public body within the territory of a Member (iii) which confers a benefit. All three of these elements must be satisfied in order for a subsidy to exist (WTO, 2003A).

The Agreement contains a list of the types of measures that represent financial contributions (e.g., grants, loans, equity infusions, loan guarantees, fiscal incentives, the provision of goods or services, or the purchase of goods). In order for a financial contribution to be classified as a subsidy, it must be made by or at the direction of a government or any public body within the territory of a Member. Thus, the SCM Agreement applies not only to measures taken by national governments such as Japan for the 7e7 program, but also to measures taken by sub-national governments (e.g., the States of Washington and Kansas) or state-owned entities (e.g., Alenia in Italy).

Assuming that a measure is a subsidy within the meaning of the SCM Agreement, it nevertheless is not subject to the SCM Agreement unless it has been specifically provided to an enterprise or industry or group of enterprises or industries. The basic principle is that a subsidy that distorts the allocation of resources within an economy should be subject to discipline (WTO, 2003A). There are three types of "specificity" within the meaning of the SCM Agreement that would apply to the 7e7 program:

- Enterprise-specificity. A government targets a particular company or companies for subsidization (e.g., the proposed State of Kansas $500 million interest free bond for 7e7 nose and fuselage production).

- Industry-specificity. A government targets a particular sector or sectors for subsidization (e.g., the State of Washington's $3.2 billion tax incentive/ production subsidy for commercial aircraft production).

- Regional specificity. A government targets producers in specified parts of its territory for subsidization (e.g., the Japanese Government's subsidy for the production of the wing and fuselage subassemblies for the 7e7 aircraft).

The SCM Agreement creates two basic categories of subsidies: those that are prohibited, and those that are actionable (i.e. subject to challenge in the WTO). All specific subsidies fall into one of these categories. Most subsidies, such as production subsidies, fall into the "actionable" category. The 7e7 launch proposal involves several actionable subsidies that the European Commission can challenge, either through multilateral dispute settlement or through countervailing action in the event that these subsidies adversely affect the interests of EU producers. The financial support from the Japanese government for the 7e7 program may also constitute prohibited subsidies as a result of their export contingent nature (for a detailed review of the legal issues surrounding the subsidy debate, see Pritchard and MacPherson, 2004).

WTO RESOLVING DISPUTES ON THE7e7 SUBSIDIES

WTO members have agreed that if they believe fellow-members are violating trade rules, they will use the multilateral system of dispute resolution instead of taking action unilaterally. The Uruguay Round of the GATT introduced a more structured process with clearly defined stages. The agreement emphasizes that prompt settlement is essential, and the WTO has developed specific procedures and timetables for resolving disputes. If a case runs its full course to a first ruling (this should not normally take more than one year), then the company/nation that is the subject of the inquiry can appeal any WTO rulings that may emerge. If an appeal fails, it is close to impossible for the country losing a case to block the adoption of the ruling (WTO, 2003C).

We have outlined the possibility of 5 actionable and 1 prohibited WTO violations for the proposed launch of the 7e7 aircraft (see Table 2). We believe there is a high likelihood that WTO members will file disputes for the perceived prohibited subsidy of the 7e7 program by the Japanese government. One only needs to look at the ramifications of the technology gains the Japanese manufacturers will receive by producing the first ever all-composite airframe for the 7e7, which could be utilized on a new Japanese regional jet program. In fact, Mitsubishi recently announced that they are conducting a joint feasibility study with Boeing for a 30 seat regional jet, which would receive $206 million of financial support from the Japanese government (Seattle Post-Intelligencer, 2002). This newly developed technology could give the Japanese a competitive advantage in introducing an all-composite regional jet product family that would have operating characteristics costing 20% less per seat mile than current western models. Presumably Canada and Brazil would view this threat as potentially injurious to their own regional jet programs.

The aircraft producers are not the only ones that need to be concerned; the international airlines that would order the 7e7 for their long-range routes could be affected by WTO litigations. The launch customers comprised of Japan's airlines ANA and JAL will require the 7e7 program to first supply the short-range version of the aircraft. This decision may be perceived by the international airlines as a defensive move from the Japanese in protecting their national airlines because they are not prioritizing the development of the baseline and longer-range versions of the 7e7. The later versions of the 7e7 would give the international airlines a competitive edge over the Japanese airlines on international routes. Secondly, should a WTO litigation be successful and a retroactive repayment plan be implemented, the Japanese might lack the funding to develop the design and tooling for launching the baseline and longer-range versions of the 7e7.

PRODUCTION OF THE 7e7

The 7e7 is expected to burn 20 percent less fuel than existing jets on both short and long haul routes. As mentioned earlier, Boeing is departing from its traditional role (i.e., designing and building commercial aircraft), and is fast adopting a system integration position which will involve risk sharing partners for the design and sub-integration of a radically new composite aircraft. Boeing is limiting its participation to the program with a 3-7 day final assembly process based on a new system integrator approach that will entail mating the 4 integrated aircraft sections along with mounting the engines and installing the interior. While this single moving production line for both the short and base line versions of the 7e7 seems ideal for Boeing, what Boeing is really asking its risk-sharing partners to do is to design, build, and integrate components into large subassemblies for two different airplanes (Bowermaster, 2003).

The short haul model, with a range of 3,500 nautical miles, would have a maximum takeoff weight of 252,500 pounds. The reported weight savings will come from, among other things, lighter and shorter wings, lighter landing gear, and lighter electronic systems. But one has to question the commonality of components, structure and engine technologies to service two aircraft versions that have an over 45% weight difference. The risk-sharing partners could be looking at two completely different sets of designs and production tooling for building these two vastly different sizes of aircraft. As an example, the wing for the baseline model is 193 feet in length and has the capacity to hold fuel for 7800 nautical miles in comparison to the short haul version with a wing length of 170 feet for an aircraft with 3500 nautical miles range. The first tier risk-sharing partners not only have to deal with two aircraft sizes, but they will also be in charge of the 'design and build' using new materials and manufacturing processes for the 7e7 that has never been attempted within the LCA sector before. The 7e7 will be the first LCA to tout a first-of-a-kind composite fuselage and wing, and will consist of 50 percent composite materials, 20 percent aluminum, 15 percent titanium and 15 percent steel. Contrast this with the Boeing 777, which is 70 percent aluminum, 12 percent steel, 11 percent composites and 7% other materials (Mecham, 2003B). Clearly, the 7e7 is a radically different type of aircraft.

In the past, Boeing suppliers bid on their work packages from a subcontractor relationship on a fixed-price contract basis, which would limit their liability. In today's LCA manufacturing environment, the supplier is being asked to absorb the non-recurring costs of the program and to exclude these costs from their pricing (as was traditionally done in the past). The Airbus A380 is a clear example, with suppliers contributing to the development costs of the airplane launch with an estimated $3.1 billion participation. But Boeing is moving to the next level, in that subcontractors are being asked to assume the role of risk-sharing partners responsible for the design of the aircraft. System integration has clear financial advantages for Boeing by limiting development and production cost overruns, which is deferred to the risk-sharing partners. So, from Boeing's perspective, why not try to launch a 7e7 program with two very different aircraft versions? After all, most of the cost and risk exposure for the 7e7 will be at the first-tier supplier level.

Table 2. *Proposed launch funding for the Boeing 7e7.*

Funding Source	Millions $	Item	Launch Aid	WTO Status
State of Washington	$3,200	Final Assembly	Production Subsidy	Actionable
State of Kansas	$200	Nose and Cockpit	Interest Free Bond	Actionable
Japanese Government	$1,588	Wing and Fuselage	Production Subsidy	Prohibited
Italian Government	$590	Rear Fuselage	Production Subsidy	Actionable
747 Special Freighters	$500	Production Transport	Production Subsidy	Actionable
7e7 Rail Barge	$16	Production Transport	Production Subsidy	Actionable
Supplier's Support	$3,100	Non-airframe suppliers	Non-Recurring Costs	Acceptable
Boeing	$4,200	7e7 launch funding	Self Financed	Acceptable
Total	$13,394			

Table 2 summarizes the current launch funding proposals for the Boeing 7e7. These data indicate that a substantial portion (46 percent) of the estimated $13.4 billion in launch funding consists of actionable/prohibited subsidies under both the 1994 WTO-SCM Agreements and the 1992 US-EU Agreement on Trade in Large Civil Aircraft. The cartogram shown in Figure 1 offers a geographic representation of the structure of actionable and prohibited launch funding. Of the roughly $6 billion in launch funding that could be challenged by the WTO, 60% can be traced to the state of Washington, 3.3% to the state of Kansas, 26% to Japan, and 9.6% to Italy.

Our research indicates that the launch costs for the 7e7 will be approximately $13.4 billion dollars. This can be benchmarked against Boeing's reported 777-development cost of $6-7 billion that dates back to the early 1990s (compared to industry analyst estimates of somewhere between $8-12 billion). A recent comparison would be with the Airbus A380 with a reported launch cost of $10-12 billion, which in some estimates could be under by $3-5 billion. The 7e7 launch costs will be every bit as much as the A380 aircraft, though a smaller aircraft in size. Boeing is asking its partners to design and build two different sized aircraft. This will drive the cost of different sized engines, landing gears, airframe structure, facility space, tooling and additional machine tools to accommodate the launch of the 7e7. Given that a high proportion of the launch costs for the 7e7 will be covered by subsidies and/or Boeing's risk-sharing partners, Boeing's Board of Directors might be looking at a profitable venture in the 7e7 provided that WTO litigations do not take place (or are successfully appealed if they do).

STATE OF WASHINGTON

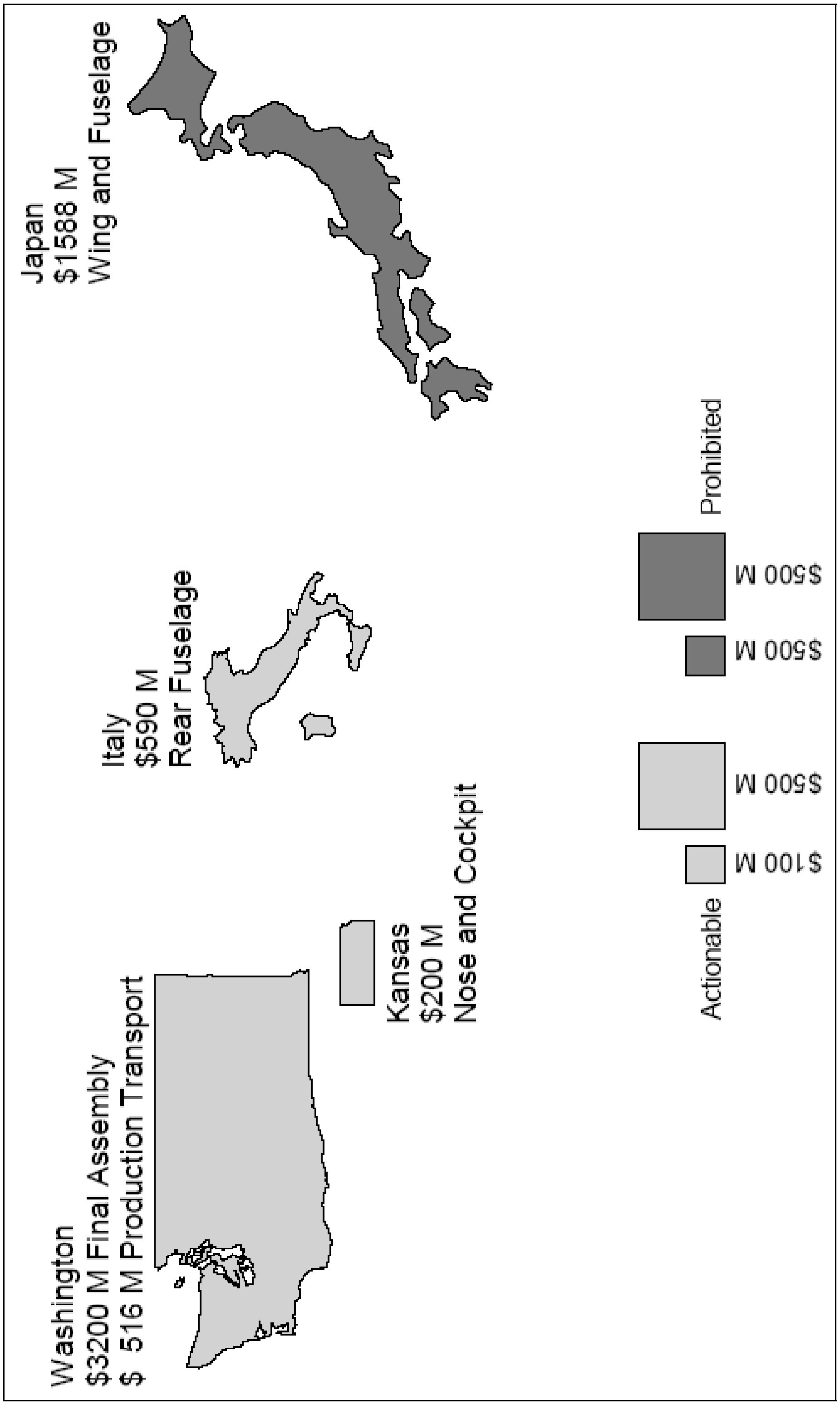
The State of Washington House Bill 2294 tax incentives are contingent on the governor signing a memorandum of agreement with Boeing to "site a significant commercial airplane final assembly facility" in the state (State of Washington, 2003). The bill contains eight specific tax changes, but the majority of the subsidy package (91% of the tax incentive) can be traced to a reduction in the State of Washington's Business and Occupancy tax rate (Washington Research Council, 2003). This tax incentive is in clear violation of WTO rules on providing production subsidies based on the following language from the House Bill 2294 "Beginning October 1, 2005, upon every person engaging within this state in the business of manufacturing commercial airplanes, or components of such airplanes, as to such persons the amount of tax with respect to such business shall, in the case of manufacturers, be equal to the value of the product manufactured, or in the case of processors for hire, be equal to the gross income of the business multiplied by the rate of:0.4235 percent from October 1, 2005, through June 30, 2007, or the day preceding the date final assembly of a superefficient airplane begins in Washington state, as determined under section 17 of this act; and 0.2904 percent beginning on July 1, 2007, or the date final assembly of superefficient airplane begins in Washington State, as determined under section 17 of this act. (State of Washington, 2003).

Based on the definitions in the House Bill 2294, the tax incentives are clearly defined for the support of manufacturing activity on commercial aircraft categorized as 'large aircraft' and identifies the production rate requirements for this tax incentive.

"Final assembly of a superefficient airplane" means the activity of assembling an airplane from component parts necessary for its mechanical operation such that the

Figure 1.

Key patterns of actionable or prohibited launch funding for the Boeing 7e7



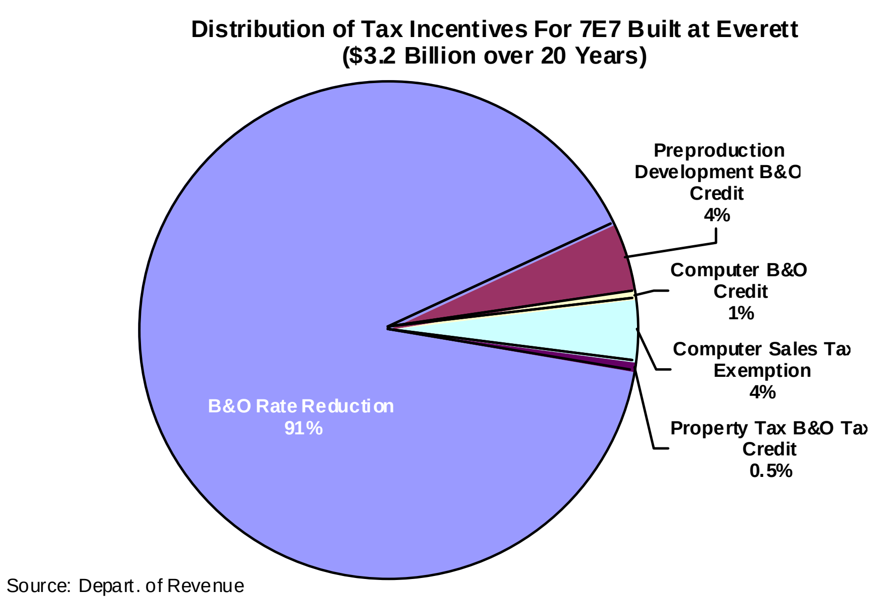
finished commercial airplane is ready to deliver to the ultimate consumer."

"Superefficient airplane" means a twin aisle airplane that carries between two hundred and three hundred and fifty passengers, with a range of more than seven thousand two hundred nautical miles, a cruising speed of approximately mach .85, and that uses fifteen to twenty percent less fuel than other similar airplanes on the market. (State of Washington, 2003)."

"Significant commercial airplane final assembly facility" means a location with the capacity to produce at least thirty six superefficient airplanes a year (State of Washington, 2003).

The Business and Occupancy (B&O) tax is the major business tax in the state, calculated as a percentage of revenues, and will apply to the production of all Boeing aircraft models assembled in the State of Washington (not just the 7E7) (State of Washington, 2003). The bill creates a separate B&O tax category for manufacturing commercial airplanes and their components. The general B&O rate for manufacturing is 0.484 percent. The rate for commercial airplanes will drop first to 0.4235 percent beginning October 1, 2005 (a 12.5 percent reduction) and then to 0.2904 percent (a 40 percent reduction) on July 1, 2007 or on the date that final assembly of the 7E7 commences, if that is later. The rate reverts to 0.484 percent on July 1, 2024 (Washington Research Council, 2003). The Department of Revenue has prepared estimates of the value of these tax incentives over the 20-year period that they would be in effect (all of the tax incentives expire on July 1, 2024). The calculations lay out three scenarios: the 7E7 is assembled at Everett; it is assembled at Moses Lake in a privately built facility; and it is built at Moses Lake in a Port-built facility. The values of the tax exemptions are $3.2 billion, $3.7 billion and $3.4 billion respectively under the three alternative scenarios (Washington Research Council, 2003). In all three cases, the bulk of the value, $3.0 billion, is due to the reduction in B&O rates on the production of all Boeing aircraft models (see Figure 2).

Figure 2.



STATE OF KANSAS

The State of Kansas approved a special incentive package to help bring work on Boeing's proposed 7E7 airplane to Wichita. The bill that resulted, S.B. 281, was passed by the Legislature and signed by the Governor. It authorizes the Kansas Development Finance Authority (KDFA) to issue up to $500 million in bonds to finance the project. The company would be responsible for repaying the principal, but the interest would be paid for by withholding taxes on the salaries of persons employed on the 7e7 project (Kansas Department of Commerce & Housing, 2003). Based on a 20-year payback with annual installments at an interest rate of 5%, this government subsidy for production of the 7e7 nose section and fuselage would equate to $200 million.

STATE OF OKLAHOMA

The State of Oklahoma proposal provides incentives for Boeing to produce parts for the 7E7 commercial aircraft in Tulsa, creating up to 800 new Boeing jobs. We believe Boeing will not fulfill its production commitments to make it eligible for the full $350 million subsidy. This is why we did not include Oklahoma in our proposed launch funding calculation. It remains to be seen how much assistance Boeing will receive from the state based on 7e7 leading edge work assigned to the Boeing factory in Tulsa. The state government had offered Boeing an interest free bond of $250 million for production support and $100 million in research and development incentives (Voorhis, 2003). The state intends to pay for these subsidies to Boeing with a proposed 4/10th of a one penny, 13-year increase in the Tulsa County Tax (Vision 2025, 2003).

JAPAN

In determining the $1.58 billion launch funding the Japanese government will supply in subsidies and loans to the five Japanese manufacturers, we assume that Japan's total workshare will be at 35% of the 7e7. On this basis, we assigned a subsidy figure of $45.3 million per one percent of workshare times the 35% content. The $45.3 million per one percent of workshare was derived from Italian investment for the 7e7 of $590 million for 13% of the 7e7 workshare. This method was utilized because Japan's Ministry of Economics, Trade and Industry (METI) is now determining the volume of subsidies and loans to be provided to manufacturers (Sobie, 2003). The Japanese Congress says it will seek national project status for the 7E7 (Ionides, 2003). In exchange for national project commitment, the Japan Aircraft Development Corporation (JADC) expects Boeing to give Mitsubishi the wing, Kawasaki the fuselage and Fuji the center wing (Sobie, 2003).

ITALY

Alenia expects to commit 500 million euros ($590 million) in investment over the next four years to win a 13% stake in 7e7 development and manufacturing (Mecham, 2003A). The investment would be needed to fund production upgrades and new tooling at Alenia's facilities in southern Italy to employ 1,000 new workers to meet its 7e7 commitments. Boeing is using Alenia as a conduit to court Italy's government funding for the 7e7 program. But this should come as no surprise because Boeing/McDonnell Douglas programs have been the beneficiaries of previous Italian state aid programs in the past. The two Boeing programs that resulted in Italian production subsidies to Alenia in the past include the MD95/Boeing 717 project for the automated production of large structural fuselage sections and MD 11 projects to improve automated production of a new generation of key aircraft parts, such as the forward section and the tail section. These two programs are a part of the European Commission complaint that has assessed 13 Italian R&D projects in the aeronautical sector alleging that the Italian government had not notified aid granted in research and development funds for about $3.7 billion (€ 3.2 billion) in favor of the aeronautic industry for the period covering 1999 through 2005 (European Commission, 2003). This EC complaint could prove to be an obstacle for Alenia in receiving production development funding for the 7e7 program.

747 FREIGHTERS AND RAIL BARGE

The Boeing Company asked states bidding for the 7E7 final assembly plant to subsidize the estimated $300 million to $500 million cost of purchasing and converting the 747s that will deliver parts to the final assembly site(s) (Bowermaster, 2003). Three converted 747 freighters will be Boeing's primary means of transporting large production subassemblies from risk sharing suppliers to the 7E7 final assembly site in Everett. This is in contrast to Airbus, which had a customized Roll on Roll off vessel built in China to transport the A380 airframe structure. The A380 RoRo vessel is taken by Airbus on a Time Charter contract for a period of 20 years. This is a commercial arrangement without any government support and is equivalent to a wet lease operated by a joint venture between Fret/Cetam. The State of Washington Legislature is also considering providing approximately $16 million for the construction of a rail barge facility as part of the State's incentive package to the Boeing Company to build the new 7E7 airliner at the Everett plant (Wallace, 2003). The purpose of this project is to allow the transshipment of much larger oversized aircraft component containers from the Port of Everett's deepwater marine terminal to Boeing's Everett plant (Port of Everett, 2003). This facility would not only support the 7e7 production program but all current aircraft programs at the Everett plant.

Boeing

The $4.2 billion launch cost is based on two factors: first is from Boeing statements that the 777 launch costs were between $6-7 billion, though Boeing has never officially disclosed the actual costs but did say the company called the 777 program at the time "the world's most expensive privately funded commercial venture" (Branegan, 1995). The second factor is based on statements from Boeing board members in 2003 that has targeted the Boeing contribution to the 7e7 program at no more than 60% of the 777 program (Pae, 2003). Thus, $7 billion times the 60% contribution limit gives us an estimated $4.2 billion Boeing contribution to the 7e7 program. The Boeing self-financed portion of $4.2 billion is less than the comparable $5.2 billion that EADS and BAE Systems self financed for the A380 program (EADS, 2003). We can expect new production subsidies to evolve as the program moves forward with first tier risk sharing partners developing second tier subcontractors.

DISCUSSION & CONCLUSION

The Airbus versus Boeing subsidy debate has been raging for more than three decades (for a concise overview, see Esty and Ghemawat, 2002). A new debate would likely differ from earlier disagreements in at least three respects. First, the 7e7 launch plan includes both foreign and domestic subsidies. Second, close to 50% of the launch funding is slated to come from sources that are classified as 'actionable' or 'prohibited' under the WTO's subsidy rules. Third, substantial state-level subsidies are part of the launch plan (e.g., $3.2 billion from the state of Washington). Taken together, these three elements of the launch process add up to a public/private partnership of massive scale. From a public policy perspective, one has to question whether this represents good value for money. Given that most of the value-added on the 7e7 will be earned by foreign partners rather than by Boeing or by US-based suppliers, US institutions might better serve the national interest by subsidizing those aspects of Boeing's aerospace business that operate with higher US content. Alternatively, subsidies might be allocated to Boeing for key parts of the airframe (e.g., wings), so that the US could at least maintain its core competence in airframe design and production. While Boeing is a global company, which means that production must also be global, the devolution of critical tasks to foreign suppliers ultimately raises strategic questions regarding the long-run viability of US commercial aircraft production in the LCA category.

The proposed structure of launch funding for the 7e7 clearly violates global as well as plurilateral subsidy regulations. Subsidies deployed by the governments of foreign production partners also violate these regulations. While the theory of strategic trade policy suggests that subsidies can be justified if the ultimate benefits exceed the costs, there is no direct or robust method of estimating these 'benefits'. Given that as much as 70 percent of the 7e7 will be manufactured outside the US, the domestic employment impact of this venture is likely to be much lower than has been true in the past for a new US aircraft launch. To complicate matters, the 7e7 has yet to attract any firmly committed launch customers. Further, the selling price of the 7e7 may ultimately be increased beyond current expectations if a WTO ruling allows injured parties to adopt countervailing measures. Will the world's airlines want to commit to the 7e7 under these circumstances? From a game-theoretic perspective, Airbus might respond to the 7e7 subsidy package with new production subsidies for Airbus products. Who would win the 'subsidy war'? Given the importance of LCA exports to both the EU and the US, a subsidy war is a distinct possibility. Such a war, of course, would contravene the spirit and mandate of the WTO at a time when the thrust toward more liberalized international trade is already floundering.

It is worth repeating that the 7e7 risk-sharing strategy proposed by Boeing is new to the LCA industry in at least two important respects. First, risk-sharing partners are being asked to absorb the full non-recurring costs of subassembly development (including design). This dramatically reduces launch costs for the prime contractor. Second, risk-sharing partners are being asked to produce extremely complex and technologically advanced parts of the airframe. Presumably these companies will experience cost over-runs as they attempt to 'get it right'? Japan, for instance, has never built large composite structures for large aircraft before. Should Japan obtain this competence with help from Boeing, what is to stop this particular risk-sharing partner from eventually building its own aircraft industry to compete with the original systems integrator? These are, admittedly, very complex issues that go beyond the scope of this paper. Nevertheless, the potential implications for the geography of LCA production at the global level are nothing short of enormous.

Finally, we should note that the analysis presented earlier opens up new sets of research questions for economic geographers, trade policy analysts, and students of industrial organization. To begin with, how efficient are public subsidies in terms of both short and long-run regional economic effects? Second, to what extent might globally organized systems integration be tweaked so as to comply with WTO regulations on production subsidies? Third, what is the net impact of systems integration on international patterns of intra-industry trade and the US balance of payments? Fourth, what are the long-run strategic implications of global subcontracting and knowledge transfer for company-level, regional, or national innovation capability? While we have not done a terribly good job of profiling these types of issues in the present paper, there is clearly considerable scope for additional research on the geography and structure of LCA production as the 2000s unfold. We hope to conduct further research in these areas over the near future.

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