Realist Liberalism?

A Comparison of the Regional Development Schemes behind the Lockheed Martin's F-35 and the Eurofighter Typhoon

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Consumers seeking the latest running shoes, lipstick, electronics, or virtually any other merchandise will no doubt appreciate the global effort and fiscal benefits of international markets and global supply chains. However, when states as consumers are interested in procuring the latest high-value military capital, the methods of procurement and development are much more complex. Of particular interest is the burgeoning aerospace industry, whose products have become so exceedingly expensive that single states - not even the United States – cannot independently afford to absorb the cost of production. Instead, strategic global partnerships have been forged to develop military assets like fighter jets, whose price tag commonly exceeds $100 million per unit. At first glance, this cooperative, international approach to defense procurement mimics the very same liberalized, globalizing economies that bring cheap consumer goods to market; in fact, it is the domestic tax-payer who will reap the savings of cheaper public goods. If this were true, it would shatter the realist conception of defence procurement where states guard their military assets and industry against exploitation by adversarial nations. In pursuit of a more thorough explanation of global defense partnerships, this analysis will investigate the domestic, regional, and international politico-economic consequences of the Eurofighter Typhoon and the United States' Joint Strike Fighter Program.

The End of the Cold War and the "New Regionalism"

The end of the Cold War saw the emergence of American military and economic hegemony on the global stage. In the years following the fall of communism, structural realists predicted the rise of European and Japanese military economies designed to challenge, or at least counter, this American hegemony.[1] While no single state rose to prominence, many powerful regional trade areas emerged and strategic free trade networks like the North American Free Trade Agreement (NAFTA), the Southern Common Market (MERCOSUR), and the European Union (EU) became bastions of international trade and commerce.[2]

While intra-state trade in goods and services flourished, national defense industries struggled to find new value in the face of the peace dividends of the 1990s. Dual-use technology, or the development of military hardware that had value in civilian applications, became the focus of many security firms.[3] However by the late 1990s, deep cuts in national defence budgets around the world left thousands out of work. In the U.S., states that once housed large defense firms suffered unemployment rates that were two-and-a-half times the national average.[4] [5] Further compounding the industrial effects of de-militarization was a fundamental re-orientation of the economy towards service-based commodities.[6] For its part, the U.S. Department of Defense went to great lengths to revive the industry by providing incentives to firms that actively work with civilian partners in the development of emerging technologies.[7] [8]

As national defense budgets receded throughout the 1990s, so too did the number of independent, security sector prime contractors thanks largely to a process of international mergers and acquisitions.[9] In the United States alone, a handful of prime contractors currently remain of an original twenty in the early 1990s.[10] [11] The number of domestic suppliers of small arms, grenades, and long-range bomber aircraft rapidly decreased, often

to the point where only one single supplier existed.[12] Apart from the potential for monopolistic production, this industrial aggregation produced a complex "hub and spoke"[13] network of industrial development where prime contractors sub-contract simple production tasks to domestic or international partners, while maintaining key final assembly tasks within their domestic purview.[14]

The European experience with economic de-militarization has been considerably more successful than that of the United States; however, it is also considerably more complex in its understanding. Part of Europe's success can be attributed to an already dual-focused, second tier defense industrial sector able to quickly and efficiently transfer technological gains from the military sector into civilian applications.[15] [16] During Cold War, Western European states spent considerably less on defense per annum than their American counterparts, thus making the transition back into peacetime economies much less drastic.[a] Equally important to European industrial re-orientation was the existence of broad social welfare nets. In Germany, for example, firms that could not adjust to a more civilian orientation failed, as the government's laissez-faire approach to "firm and community adjustment"[17] was backed-up by significant welfare programs to displaced workers. However, great care must be taken when discussing the European aerospace industry as a unitary actor, for it most certainly is not. Any such analysis must take into consideration the fractious nature of European defense policy and the absolute freedom that European Union (EU) member states exercise in developing domestic arms industries. While the EU remains a relatively open zone of mobile trade, we must remind

[a] During the period from 1988 to 2000, the four major Eurofighter states reduced their average annual defense spending (as a per cent of GDP) by only .26 per cent, compared to 2.5 per cent in the United States over the same period. "SIPRI Military Expenditure Database" *Stockholm International Peace Research Institute.* http://milexdata.sipri.org/

ourselves of the exceptional nature of defense materiel within these zones.

Defense networks like those surrounding the F-35 and the Eurofighter are not outcomes of free-trade legislation. In fact, international trade regimes explicitly exempt governments from abiding by free-trade regulation when it comes to the production and acquisition of defense materiel. The European example below clearly illustrates member states' ability to insulate domestic defense firms from outside competition with tariffs or protections:

> *...any Member State may take such measures as it considers necessary for the protection of the essential interests of its security which are connected with the production of or trade in arms, munitions and war material; such measures shall not adversely affect the conditions of competition in the common market regarding products which are not intended for specifically military purposes.*
>
> - EU Article 296 (1)(b) formerly a. 223 of the European Community Treaty

Similar language can be found in the North American Free Trade Agreement.[18] Even the World Trade Organization (WTO) recognizes states' rights to insulate industries relating to domestic security.[19] While this paper explores the Eurofighter as a European outcome, it is not a direct product of European integration and should not be referred to or considered as such. It can, however, be considered a fine example of selective regional cooperation taking place under the auspices of the EU economic umbrella.

Finally, aerospace materiel is often among the most costly, technologically intensive, and politically sensitive assets that a state may acquire, and therefore remains an intriguing product of global patterns of economic development. Tracing the production

and procurement of combat aircraft offers valuable insight into the regional norms inherent in the economic relationships between allied states and sub-state actors. The F-35 and the Eurofighter can be used as comparable case studies as both are expected to carry out a similar combat role and both have had a profound effect on economic and defense relations within their respective development regions. Another important factor in studying aerospace assets is the sheer time it takes to develop these aircraft from conceptualization to the production line. With design and pre-production taking well over a decade in some cases, these programs often outlive successive governments, thus making them more indicative of longer-term *regional trends*, rather than the political trend of one administration over another. Those with more intimate, technical knowledge of these two programs may cite the technical differences that set these two aircraft apart and thus claim this analysis obsolete by virtue of an asymmetric comparison.[b] This line of argument is, however, technologically deterministic, and this analysis advances the commonly-held notion that the most pertinent military weapons system is in fact the state military entity as a whole, with doctrinal and procurement actions legally shaped by civilian preference via the decisions of elected officials in conjunction with military planners. The technical virtues of one aircraft over another is ultimately irrelevant and, for the purposes of this paper, both will be considered as little more than a common 'widget' of production.

The Eurofighter Typhoon

Designed in the closing years of the Cold War, the Eurofighter Typhoon was intended to replace aging, largely

[b] Within aviation circles, fighter aircraft are classes into five generations, with each successive generation marking the introduction of paradigmatic technology that may not have been available to previous generations. The F-35 is a fifth-generation fighter aircraft, while the Eurofighter remains a 4.5th generation aircraft. One of the defining elements of the F-35 is its limited low-observability (stealth) design, a feature not incorporated into the Eurofighter.

American-built fleets of aircraft. While the idea of a new, all-European fighter dates back to the early 1970s, the multinational holding company now responsible for its production, *Eurofighter Jagflugzeug GmbH*, was struck in 1986 and includes firms representing Germany, the United Kingdom, Spain, and Italy.[20] By design, the Eurofighter program delivers benefits to member states in proportion to early investments, with four final assembly plants in each of the partner states locations. Interestingly, final acquisition and management of the aircraft and its sub-systems are governed by NATO on behalf of the member states' Air Forces. Though there are many reasons for an all-European fighter, GmbH makes quite clear the need for "…an independent European combat aircraft industry allowing independence from the USA."[21]

The massively complex organizational structure of Eurofighter GmbH, compared to the small number of aircraft produced, is a telling sign of the capital required to produce a fighter aircraft and the dispersal of that capital across a number of European prime contractors. Within the airframe consortium are a number of transnational industries, including the British-owned BAE Systems, an Italian-owned aerospace subsidiary of Finmeccanica; Alenia Aeronautica, and EADS, a European conglomerate of Airbus, Eurocopter, EADS Astrium, and EADS Defence and Security.[22] Another European consortium, *EUROJET Turbo GmbH*, is also responsible for the development and production of the Eurofighter's EJ200 engines.[23] From the beginning, the Eurofighter has been a model for collaborative design, and this collaborative effort was also reflected in the production of the aircraft itself.

Production of the Eurofighter is strategically designed to disperse labour equally between each of the four original member states. Indeed, the production of the Eurofighter is truly an international affair, with the front fuselage built by BAE in Britain, the right wing built in Spain by EADS, the left wing in Italy, and the centre section built by EADS Deutschland.[24] Ultimately,

however, each partner state is responsible for the final assembly of their own Typhoons, an approach that has secured some 30,000 jobs in Germany, 24,000 in Italy, 22,000 in Spain, and 40,000 in the U.K.[25]

While production responsibility lays with Eurofighter GmbH, the North Atlantic Treaty Organization (NATO) maintains overall responsibility for acquisition and maintenance of the aircraft on behalf of the member states' Air Forces. The NATO Eurofighter Tornado Management Agency (NETMA), adds a curious layer of strategic transnational governance that merits some discussion around the diverging goals of NATO and the emerging intergovernmental European Security and Defence Policy (ESDP). The expressed goal of the ESDP is to integrate European military decision-making and capacity around a uniquely European policy.[26] Within some circles, NATO is seen as the constructed extension of American military power into Western Europe; thus, the continued rationale for NATO's overseeing of both airframe and engine development is confounding.[27]

The Typhoon's production scheme reaffirms a liberalized, all-European development strategy that focuses on the development of a product fit for export. In fact, in 2007 the Austrian Air Force purchased 15 aircraft and in 2006 Saudi Arabia finalized an order for 72 aircraft.[28] [29] By late 2009, the Eurofighter program had resulted in the production of just under 200 aircraft of a total order of 707.[30] [31]

The F-35

The F-35 Lightening II represents the United States' largest military acquisition in history, and as a 2004 Government Accountability Office (GAO) memo plainly states, "… has the potential to significantly affect the worldwide defense industrial base."[32] Arguably, the F-35 program was inspired by the failure of a prohibitively expensive domestic aerospace program and a need

to maximize cost efficiency within the three branches of the U.S. military. Unlike the collaborative, consortium-led approach employed by the Europeans, the outcome of the Joint Strike Fighter program utilized a final competitive bid process between American aerospace giants Boeing and Lockheed Martin, the only independent aerospace firms capable of producing such an aircraft (as discussed earlier). Throughout the process, international partner-states were encouraged to 'buy-into' the program through a multi-tiered partnership agreement that allowed limited access to JSF development contracts. Undoubtedly, the U.S. is Lockheed Martin's largest customer, so it is only natural that a significant proportion of the aircraft's development remain within the U.S. However, production of the F-35 remains a relatively closed process that is designed to protect U.S. industrial interests in the Aerospace sector.

The ultimate failure of Lockheed Martin's F-22 Raptor program is a cornerstone in the development of the F-35, and a telling indicator of drastic change in the nature of domestic materiel production. In July 2009, the President of the U.S. and Congressional and Senate Democrats blocked funding for the further procurement of any additional F-22 Raptors, finally signalling the end of a program that had attracted years of criticism for its ballooning costs and unforeseen shortcomings.[33] Initially envisioned at a program cost of $150 million per unit, the F-22 was estimated at well over $300 million per unit by 2005, and many attributed these drastic cost increases to an uncompetitive environment wrought by industrial aggregation within the United States.[34] [35] Furthering the controversy over the cost, the U.S. Air Force was predicted to be Lockheed Martin's only purchasing customer, as the aircraft was the subject of a Congressionally legislated ban on the export of the aircraft. Designed to "…[protect] U.S. intellectual property in F-22 technologies and denying adversaries access to these technologies,"[36] the ban reaffirmed the fact that the state was still very much interested in maintaining strict export controls on its military assets, even in the

face of prohibitively escalating costs. Ultimately, the F-22 program was cancelled after the production of only 187 aircraft, and its replacement would be the smaller, cheaper, and, perhaps most importantly, exportable F-35 Lightening II.[37]

The regional development scheme of the F-35 focuses on domestic production and leverages limited international partnership to help defray costs. The aircraft, which is actually comprised of three unique variants that utilize 80 per cent common parts, will be largely produced in California and Texas, and the final assembly of all components will occur exclusively in Fort Worth, Texas.[38] At the time of this writing, nine international partner states have bought into the JSF program, a membership that allows their respective aerospace firms to bid on small or subsidiary development tasks on a predicted production run of over 3000 aircraft.[39] [40] Perhaps the most contentious aspect of the Joint Strike Fighter program is Lockheed Martin's demand that, in order to achieve the lowest possible production cost, partner states forego traditional, protectionist *offset* measures designed to insulate domestic industry from the cost of foreign asset acquisition.[41] Typically, two types of offset measures have been used to protect domestic firms: *traditional direct* offsets, where a foreign prime contractor is obliged to integrate domestic hardware into the foreign contract at hand, and *general direct* offsets, where domestic industry is offered the ability to contribute to the prime contractor's product prior to being sold into the global market.[42] Put in simpler terms, *offset* measures reassure states purchasing goods from foreign markets that at least some of the money used to purchase those assets will be reinvested into its own domestic economy, theoretically ensuring the vitality of sectors that may have been hurt by the decision to buy from foreign, instead of domestic, firms. In the case of the F-35, neither of these offset options have been made available.[43] In lieu of defined offset measures, states who have elected to sign on to the project are offered exclusive access to bid on lucrative sub-system contracts.[44] Participating states shape their commitments and returns by

entering into the JSF program in one of three industrial tiers: tier one requiring the investment of approximately $2 billion,[c] tier two demanding roughly $1 billion, and tier three partners investing around $100 million.[45] These funds are not paid directly to the JSF's American prime contractors but are instead held as domestic, liquid capital that is to be made available (in loans) to domestic firms interesting in participating in the JSF program. Therefore, the program 'buy-in' process actually resembles that of a strategic stimulus plan, designed to make partner states more competitive within the closed F-35 sub-system contract market. Of course, access to a competitive bid process does not assure returns on investment, as the spoils of the project will only be granted to lowest bidders, a matter that will be explored using Canada as a case study later in this paper.

In a move reflecting the congressional export ban on the F-22, Lockheed Martin and the United States government has reaffirmed that the F-35's integral operating software will not be shared with any partner state.[46] Eight million lines of software, which manages flight controls, weapons systems, communication, and navigation, must be programmed at a specially designed facility at Eglin Air Force Base in Florida.[47] Referring to other partner states, JSF program director John Schreiber stated "Nobody's happy with it completely. But everybody's satisfied and understands."[48] In addition, it appears clear that all international military personnel designated to fly their respective state's F-35's will be trained at a specially designed facility at Eglin Air Force Base, Florida, instead of within their own state's purview and borders.[49]

Finally, one would be remiss in not mentioning what appear to be significant setbacks in the unfolding of the JSF program. In April of 2011, the U.S. Government Accountability Office (GAO)

[c] Tier one partners retain full decision-making rights in the program. Great Britain is the only state to be included as a tier one partner.

expressed their concern that the program was underperforming in three broad areas: the increasing need for engineering redesigns late into the pre-production stage, an underestimation of time needed for software development, and marked shortcomings in achieving clearly defined testing, contracting and manufacturing goals.[50] These setbacks are considerable, especially to the B variant of the aircraft, which, as the program's own director has stated, will be cancelled unless current issues can be resolved.[51] In June 2010, the JSF program officially breached the Nunn-McCurdy threshold, a law enacted in 1983 designed to limit or terminate acquisitions that exceed their projected baseline costs by more than 25 per cent. By 2010, the F-35 program had grown to between 57 and 89 per cent above its 2002 program baseline, a situation which then required the Secretary of Defense to inform Congress of the overruns, to certify that the program is essential to national security, and to provide a corrective course of action.[52]

Analysis: Understanding Defense-Oriented Regionalism

The aggregation of global aerospace prime contractors in the post-Cold War era presents significant challenges to realist and liberal theories of political economy. Indeed, gaining an insightful perspective on the relevance of these two programs requires the forfeiture of the clearly defined theoretical taxonomy in favour of a blurrier and perhaps more unsatisfying understanding of the origins, necessity, and future of defense-oriented regionalism through the lens of the aerospace sector. Once defence-oriented regionalism has been defined conceptually, we may assess its potential impacts on domestic aerospace industries. Admittedly, the majority of this analysis is committed to understanding the relevance of the F-35 to global and regional economic communities, as the Eurofighter is a mature piece of technology already in production in various European states. With Canada, a current third-tier partner in the JSF program, this analysis will also feature the impacts of the program on domestic military and industrial capacity. However, with the F-35 program still

unfolding, and many Canadians embroiled in debate over the program, it must be stated that this analysis claims no allegiance to establishing one program's superiority over another; instead, the reader is encouraged to draw on any and come to their own conclusions.

Through the lens of near-orthodox liberalism, these international development regimes seem only natural. In a competitive market environment, the creation of competitive, international supply-chains will drastically reduce final product costs while at the same time allowing partner states access into lucrative, pre-production development contracts. Although this paper has only briefly discussed the prevalence of international trade regimes like the WTO and NAFTA, the regional development programs driving these aircraft are in themselves similar to transnational regimes like the EU community, NAFTA, and the WTO in that partner states enter into common understandings about their role in production and development. The European approach to regime building differs greatly from the American approach. The transnational regime governing the production of the Typhoon is one that centers on transparency and reward where member states retain rights to major sub-systems and final assembly within their own borders, thus developing, or at least maintaining, domestic industrial knowhow. As socially-oriented as the program may be, the approach to development cannot be fully explained under the banner of orthodox liberalism. Ultimately, the aircraft is being produced in five locations, with a complex network of just-in-time logistics dictating the rate of production and cost per unit. If planners were truly concerned about achieving the best cost-per-unit, and thus delivering the best value to their taxpaying publics, the production program would be much more centralized within a single location. According to one source, each of the four main Eurofighter production lines represents a 130 million Euro investment in start-up and annual maintenance, representing a considerable duplication of effort.[53] However, all is not lost for the liberal school of thought. The

notion of comparative advantage, or states capitalizing on favourable domestic labour environments to produce high-demand exportable products, appears alive and well within the four major Eurofighter states; on average, those working on the production line in Germany may earn up to 65.6k Euro, while the same line worker in the UK earns only 30.4k Euro.[54] So, while the Eurofighter may represent the benefits of European unionization, citizens are not necessarily benefiting from the program equally. Relative to the Eurofighter, the F-35 has followed a highly centralized development scheme from inception. The F-35's governing regime, the Joint Strike Fighter (JSF) program, has ensured that major production and *all* final assembly remains within the United States' borders and, as explained above, utilizes a tiered, competitive bid process to award sub-contracts to industrial partners within members states. Nevertheless, as long as national security remains a variable in the formula, it is impossible to imagine either of these programs existing within an orthodox liberal architecture. States are obliged to protect themselves, and opening the door to procurement from the lowest international bidder introduces a host of concerns.

An orthodox realist would likely see both of these development schemes as an existential risk to national security, both in the risk of interruption of supply to materiel during crises, and the possible leak of proprietary information into hostile hands. Although there is a place for international trade in the realist's perception, the production of defense material is not traditionally one of them. Of the two programs, the F-35 remains closest to the traditional, realist interpretation of a domestic economy protected from outside influence. But perhaps it is time to reconsider the traditional interpretation. If Machiavelli's treatise on power is still relevant, one acknowledges that the city-state he once wrote of is now a complex federation of provinces and states. The orthodox realist could go one step further, asserting that regimes like the North Atlantic Treaty Organization (NATO), the former Warsaw Pact, and the European Common Security and Defence Policy

(CSDP) are the next evolutionary unitary actors in the realist sense. After all, there is no denying the strategic nature of these partnerships both in the military and economic realms. The U.S. Air Force clearly states that the F-35 will "…maintain the margin of superiority we have come to depend upon, the margin that has granted our forces in the air and on the ground the freedom to maneuver and to attack."[55] In another public statement, the economic stratagem is equally as clear. The Department of Defense has actively pursued allied participation as a way to defray some of the costs of developing and producing the aircraft and to "prime the pump" for export sales of the aircraft."[56] Now, considering the re-framing of the unitary actor and the U.S.'s overt military and economic agenda, it becomes much easier to situate the F-35 almost entirely within the realist perspective of defense acquisition. Barring the Eurofighter's decidedly social orientation, its original inception is partially explained by a realist need to safeguard European aerospace industries from extinction in the face of growing American market dominance.

In the most practical sense, neither the liberal nor realist perspective can wholly explain the emergence of complex, defense-oriented regional relationships or clusters. Like generations of American aircraft that have come before it, the F-35 is an opportunistic program designed to satisfy the need to replace a fleet of legacy aircraft, while at the same time ensuring that the product remains marketable to international customers. Arguably, this approach has more to do with the astronomical costs associated with the development and production of modern fighter aircraft than it does the willing extension of national hegemonic power. In fact, according to some estimates, the cost of producing a fighter aircraft, adjusted for inflation, doubles every eighteen years.[57] [d] This means that strategic regional communities of states

[d] The methodology behind this estimate is contentious, as this particular report used weight as a basic unit of comparison. Including certain built-in assumptions on the increase of aircraft size and mass, one kilogram of fighter aircraft in 1950 was compared to one kilogram of fighter aircraft in 1990.

are required to share the risk inherent in high-value defense procurement. The European region and the North American region have followed unique pathways to procurement in the hopes of satisfying ironically common goals. For the most part, the Joint Strike Fighter is being developed under U.S. terms and laws and is designed to spread the financial risk of re-capitalizing large Naval, Marine and Air Force aerial fleets with many international partners. The Eurofighter, which is a much smaller program in comparison (some 700 aircraft versus the F-35's 3000 plus), is illustrative of Europe's tendency towards marginal defense spending, while at the same time attempting to protect domestic industrial capacity against intrusion from American influence. Although the Eurofighter was conceived of and produced earlier than the F-35 program, it can clearly be viewed as an attempt to mitigate the influence of the U.S. aerospace within Europe.

Theoretical examination of these case studies offers an intriguing look at global trends; however, little insight is gained around the actual domestic effects of partnership in defense regions. Canada's proposed F-35A acquisition has stirred considerably debate in Parliament, major media outlets, and even on streets and in classrooms across the country. These discussions reveal two major elements of partnership that are worth exploration. The first element focuses on the economics of acquisition and is largely concerned with illustrating the benefits and drawbacks of participation in such a large project. The second, possibly more contentious, element concerns the effects that JSF participation will have on the sovereignty of decision-making when it comes to Canadian military doctrine.

Canada is a third tier partner in the JSF program and has subsequently invested $150[e] million into the pre-production phase.[58] This access afforded Canadian industry the ability to bid

[e] Of which $100 million originated from the Department of National Defense, the other $50 million coming from Industry Canada's Technology Partnership Fund. Williams, *Reinventing Canadian Defense Procurement*, 52.

on 376 sub-contract competitions, of which 90 per cent were actually bid upon.[59] 65 Canadian firms, universities, and government agencies won just over 40 per cent of these competitions for an estimated predicted value between $4.8 and $6.8 billion (USD) over the production lifespan (2002-2023) of the F-35 program.[60] If the program develops as expected and these figures are realized, there is little doubt that Canada can expect to fully recoup its initial research and development investment of $150 million. What is less certain is the price Canada will pay for its planned acquisition of 65 F-35A's (conventional take off and landing variant). Fortunately, it is the B variant (vertical take-off and landing or VTOL) and to some extent the C variant (carrier based), that has been experiencing critical design setbacks. Unfortunately, with all three variants so intrinsically linked in component sharing and production, setbacks for one variant will inevitably affect the other programs - if not in the rate-of-production, then certainly in the per-unit cost. Perhaps more than any other issue, Canadians find themselves embroiled in debate over what they believe to be the uncertainty of the cost of these aircraft, an understandable quarrel considering that the price-per-unit ranges from around $110 million[61] to the Parliamentary Budget Officer's (PBO) estimate of nearly $168 million per jet. Unfortunately, no two cost analyses have taken into account the same factors and therefore cannot be compared with any accuracy. The lower figure actually represents the cost of the air vehicle without the cost of engines,[62] which add an anticipated $15 million on to the unit price of each aircraft.[63] In the wake of the PBO's high cost analysis, various reports were issued heavily criticizing the top-down statistical methodology of the PBO (Analysis of Parliamentary Budget Officer Cost Estimates for the Joint Strike Fighter Project).[64] It is, therefore, dubious to rely on either figure as an accurate analysis of cost; however, it is probably fair to assume the exact figure lays somewhere in the middle of that range, as individual costs are dependent on everything from the state of the production line to the sustained commitment of other international partners. If nothing else, Canadians must expect the

actual price of the aircraft to fluctuate in conjunction with the project demands and setbacks. If production can return to schedule and the number of international partners increase, we can safely assume the price of the aircraft to drop. If the B variant of the aircraft does indeed fail, and international partners withdraw from the program, we may assume the price per-unit to climb. This simple take on an incredibly complex production plan should illustrate the most basic economic consequences of domestic participation in a regional defense scheme. Flexibility of price is key, and Canadians should be prepared to see the price debate continue in coming years, or at least as long as Canada remains a partner in the JSF program.

It should be clear by now that large-scale defense acquisitions like the Eurofighter and F-35 create intertwined economies of scale, but what is considerably less clear is the effect they have on domestic military doctrines. For instance, does a low-level state partner in the F-35 project forfeit some measure of military sovereignty of action in favour of allied preferences within that region? Perhaps it is here that this paper must come face-to-face with its own technical determinism in placing fighter aircraft at the focal point of regional defence communities. All too often, pundits, historians, and politicians cite the decisive merits of various weapons systems in the execution of foreign policies, or the decisive role technology plays during times of conflict. In reality, weapons systems are sub-systems within a greater military system that is guided by firm doctrine and led by rational, humane leadership. When it becomes necessary to acquire higher-value military hardware, this leadership is responsible for formally framing its requirements, and civilian public servants are responsible for tendering out the contract. Procurement follows military doctrine, not the other way around. Interestingly, one may look to the Eurofighter's recent role in Libya for proof of this, as Great Britain was the only state to deploy these aircraft to the region. However, just like industry in the economic realm, programs like the JSF expose state military institutions to varying

levels of risk, especially in states that are looking to quickly replace increasingly unserviceable aircraft. If existing aircraft are retired before they are effectively replaced, air forces are left with a gap in their capacity to perform various mission types. Australia, an F-35 partner, is just such an example. Due to earlier than expected rust-out of its fighters, the Royal Australian Air Force was forced to retire its F-111's early and purchase 24 F/A-18F aircraft from Boeing (Lockheed's main continental competitor) in order to temporarily fill their capacity gap.[65] Canada expects delivery of its first F-35A's in early 2016, at which time it will likely begin phasing out the CF-188 before it reaches the end of its serviceable lifespan in 2020.[66] If F-35 deliveries do slip, and aircraft are delivered years after their expected dates, Canada may face a situation similar to that of Australia.[67] Finally, and perhaps most contentiously, Canada is already a member of NATO and North American Air Defense (NORAD). The decision to purchase the F-35A alongside side its allies does not create new defense alliances, but strengthens existing ones. In a speech before the Standing Committee on National Defense, Canada's Chief of the Air Staff, Lt. General André Deschamps illustrates these alliances clearly:

> We need a capability that helps us carry out our core missions of defending the sovereignty of Canadian and North American airspace through NORAD, providing Canada with an effective and modern capability for international operations, and effectively conducting joint operations with our Allies through NATO or a coalition.[68]

If the U.S. retains its exclusive aircraft maintenance and pilot training schemes (as mentioned above), Canada may face considerable, but surmountable sovereignty issues regarding its asset management. However, Canadians should not be concerned that JSF partnership brings additional military responsibilities, at least no more than NATO and NORAD already demand.

Conclusion

High-value aerospace production offers a tantalizing look at current state of international military procurement practices. Ironically, the F-35 and Eurofighter Typhoon are a dying breed, as most states have announced their intention to end production of manned fighter aircraft.[69] In their place, cheap, unmanned, remotely controlled vehicles will take to the skies to fulfill a variety purposes. Besides being deeply saddening to the author of this paper, this shift in production focus, coinciding with drastic drops in per-unit prices, will undoubtedly deflate the economic and doctrinal influence of regional aerospace production schemes. Until then, the F-35 and Eurofighter stand as unique products of defense regions that, in both cases, are focused on sustaining domestic industrial capacity into the future. Unlike smaller defense acquisitions, fighter aircraft have the ability to shape both international markets and domestic economic policies of partner states. However, as these two aircraft have proven, their development schemes defy traditional political taxonomy by applying liberal, market-driven cost control measures while at the same time operating within greater, protectionist schemes that greatly benefit the U.S. in the case of the F-35, and Germany, Italy, Great Britain, and Spain in the case of the Eurofighter.

Notes

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