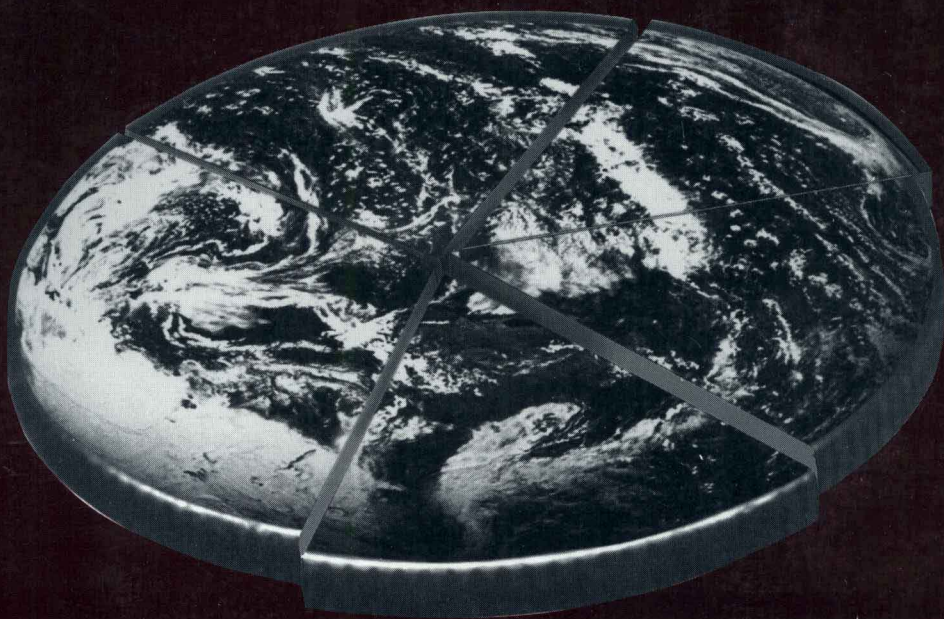


# TRADE WARRIORS

States, Firms, and  
Strategic-Trade Policy  
in High-Technology  
Competition



MARC L. BUSCH

# *Trade Warriors*

*States, Firms, and Strategic-Trade Policy in  
High-Technology Competition*

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## Introduction

In 1990, the president of the Semiconductor Industry Association urged Congress not to abandon his membership in its trade dispute with Japan. In an impassioned plea before a receptive audience, this influential witness testified that there was a difference between semiconductor chips and potato chips that mattered for the nation as a whole.<sup>1</sup> His plea did not fall on deaf ears. Few on Capitol Hill thought of the semiconductor rivalry as just another trade dispute. These chips, after all, are the underpinnings of the information age, the kind of high-technology industry in which governments might invest to leverage their economic growth and competitiveness. Perhaps not surprisingly, Washington reaffirmed its commitment to “level the playing field” in chips by funding U.S. firms and by seeking to renew the Semiconductor Trade Agreement.

At about the same time, the American Electronics Association’s vice-president argued before Congress that his membership, too, needed help if it was to compete with Japan in high-definition television (HDTV).<sup>2</sup> Like those who had pleaded the case for government intervention on behalf of the semiconductor industry, proponents of HDTV explained that there were too many key technologies at stake to let U.S. firms fend for themselves. One sympathetic lawmaker put the matter more succinctly than most, claiming that the fight over HDTV had “become a symbol of America’s willingness to compete in a tough new world in which foreign competitors target every aspect of modern industrial technology.”<sup>3</sup> And yet, this plea fell on deaf ears. Indeed, not only did Washington deny the industry start-up funding, but there was no attempt to push for an agreement limiting what Japan spent on *its* “na-



tional champions," leaving U.S. firms to go it alone against subsidized competitors abroad.

Why such different trade policy outcomes across these two industries, despite all they have in common? Most notably, semiconductors and HDTV were both argued to be on the cutting edge of high technology, the expectation being that they would help stimulate entire sectors of the American economy. Moreover, since the contours of these industries limit competition to only a handful of firms, and favor larger producers over smaller ones, Washington might have been expected to use trade policy *strategically* to help American firms win market share from Japan in HDTV, just as in semiconductors. Further, there may have been good reason to expect Washington to follow through, since by subsidizing the exports or research and development (R&D) of its national champions, protectionism might well have been profitable, enticing the government to overrule the market's verdict on HDTV.

The way in which the semiconductor and HDTV battles have been fought sheds light on some of the most heated commercial rivalries unfolding today, as well as on how some highly anticipated commercial rivalries will likely be waged in the future. From satellites and rockets to biotechnology, developed and developing states have been jockeying for a foothold in high-technology industries, the spoils of which may be had by just a few lucky winners. These commercial rivalries are fueled by concerns that gains and losses may be path-dependent, and that success in these industries may confer an insurmountable lead in building the "economy of tomorrow." Against this backdrop, a state might be expected to fight for its national champions across the board in high technology,<sup>4</sup> and yet the United States chose not to fight for HDTV. Why?

One likely explanation centers on the threat of foreign retaliation. Where a rival state provides its national champions with offsetting subsidies, for example, both sides end up worse off than if neither had interfered in the market. Fear of a trade war is sure to weigh heavily in decisions for strategic trade, deterring government forays into the market where the expected costs of intervention outweigh the anticipated benefits. Framed in this light, a state might thus be unwilling to fight for its national champions across the board in high technology, and yet the United States fought for semiconductors. Why?

This book provides answers to these questions. It examines the way

in which strategic-trade policy strains relations among states, pinpointing the conditions under which trade wars are likely to arise, as well as conditions under which these trade wars are likely to be resolved. The challenge is to explain more than just a government's decision to intervene or not. In semiconductors, for example, Washington opened up the public purse, but was hardly as generous as the industry had hoped. Similarly, the Japanese government showed a good deal of restraint in subsidizing its national champions in HDTV, despite the fact that the United States had no intention of retaliating. In explaining why, the book offers fresh insights into the strategic-trade "calculus" of states.

### THE PUZZLE

The puzzle is that, on the one hand, states do not fight for their national champions as often as proponents might hope, but, on the other hand, they fight for them far more often than critics would lead us to expect. Taking the first part of this puzzle first, we find at least two reasons to expect more government intervention in high-technology industries than we, in fact, witness. First, these industries often promote the well-being of related firms and industries, stimulating a nation's economic growth and competitiveness in ways not fully accounted for by the market. For example, when an end user purchases a large volume of an input from its supplier, this can help the supplier achieve economies of scale and realize lower unit costs as a result,<sup>5</sup> a benefit undervalued by the price of this transaction. Second, and relatedly, the supplier may learn to adopt, assimilate, and employ a product, process, or management skill as it tailors products to meet an end user's needs – benefits that escape the market's attention. A state might thus intervene to correct for these market "failures," particularly in high-technology industries where, as Chapter 2 explains, it might be profitable to do so.<sup>6</sup> Posed this way, it is difficult to see why a state would ever be reluctant to fight for its national champions.

The wrinkle in the story, of course, is that a foreign state might retaliate, giving rise to a trade war that would leave both sides worse off. Governments abroad may be unwilling to leave the fate of their national champions to the market, fearful of conceding industries that feed the high-technology "food chain." As competing states increase what they spend on subsidies, however, they impose ever higher costs on

each other while accomplishing less in the marketplace. Posed this way, it is difficult to see why a state would ever fight on behalf of its national champions.

A look at the real-world practice of strategic-trade policy reveals why it is important to think systematically about this puzzle. States do fight for national champions, but not in all industries, and certainly not always with the same investment of resources. And even where states fight, they sometimes cooperate with each other to ease trade tensions, but at other times not. The civil aircraft rivalry has been more heated than most, for example, in that both the United States and Europe have spent lavishly on their national champions. Yet both sides have shied away from other fights, the United States from HDTV and Europe from semiconductors.<sup>7</sup> Continuing with civil aircraft, both the United States and Europe have sought to ease trade tensions in this industry through a series of agreements. Yet, as in the case of satellites and rockets, both sides have let other fights go largely unchecked. This begs three questions. Why do states risk trade wars by fighting for their national champions in some high-technology industries but not in others? Why do states subsidize certain national champions at higher levels than others? And why, when states commit to a fight, do they cooperate with each other to ease trade tensions in some cases but not others?

#### THE ARGUMENT

In seeking to maximize their *national* welfare gains, states weigh the expected benefits from intervention against the potential costs of initiating a trade war. On the benefits side of the equation, states calculate the anticipated return to investing in a national champion. This involves gauging whether efforts to subsidize a national champion's push into world markets might leverage economic growth and competitiveness more generally. Again, this can result where relations between suppliers and end users result in scale efficiencies "upstream" or "downstream," giving rise to what is more formally referred to as a *linkage externality*, and where technology diffuses among related industries, or what is commonly referred to as a *spillover externality*. The first part of the argument, then, is that the return to investing in a national champion depends on whether related industries are positioned to benefit from these externalities. In determining this, states evaluate the extent to which their economies host the relevant upstream-downstream relations, not only

because access to these linkage externalities hangs in the balance, but because the spillovers exhibited by a national champion also tend to diffuse upstream and downstream, tying these external benefits together.

If these externalities are likely to help leverage economic growth and competitiveness upstream and downstream, the next step is for states to determine whether this payoff is strictly national. The concern, of course, is that if these linkage and spillover externalities reach beyond its borders, then it is doubtful a state would fight as hard for its national champion, or fight at all, since industries abroad may benefit as much from this helping hand as industries at home. For example, if foreign competitors are closely bound together in these upstream-downstream relations, then both sides will share in these externalities, regardless of which state subsidizes its national champions. The incentive here is thus to free-ride rather than to outspend a trade rival.

The third step in the argument is to go beyond the calculations states make about their own economies, and to bring in the calculations they make about how trade rivals abroad stack up in terms of being able to exploit these same externalities. In deciding whether to fight for a national champion and, if so, with what investment of resources, states assess the likelihood that a trade rival abroad will fight back and, if so, with what investment of its own resources. Because competing economies may not be equally primed to make use of the externalities exhibited by an industry, the will to fight for national champions need not be symmetrical across states, giving rise to some one-sided battles. This suggests that the risk of initiating a trade war is not a constant and that, at times, states may weigh in on the side of their national champions with impunity. At other times, however, state forays into the market are certain to elicit retaliation. The book's theory identifies the conditions under which these outcomes are likely, as well as the conditions under which more varied outcomes are to be expected, including the decision on the part of both sides not to wage battle at all.

The first two parts of the preceding argument touch on the theory's independent variables. The question of whether an economy is primed to make use of the externalities that a national champion exhibits taps the logic of what the book refers to as the *consumption* variable. The question of whether these externalities yield strictly national benefits taps the logic of what the book terms the *internalization* variable. All things equal, states are more likely to subsidize national champions in industries that exhibit externalities that the domestic economy can consume,

and to spend more on subsidies if the resulting benefits are internalized within national borders. The third part of the argument says that in the end, decisions for strategic trade ultimately reflect how competing states measure up on these two independent variables. Finally, the theory's dependent variable concerns the outcome of a commercial rivalry, scored in terms of which of three strategic-trade policies states practice in competing with each other: *full intervention*, *limited intervention*, or *nonintervention*. Briefly, the theory makes the following predictions.

If both states can consume the externalities at stake, and these externalities are nation-specific, then both are likely to act on the incentive to subsidize their national champions. This gives rise to a trade war in which states try to outspend each other. Here, states may seek to cooperate by jointly *lowering* their spending (i.e., practice limited intervention), rather than escalate their spending on subsidies (i.e., practice full intervention). Chapter 3 explains the U.S.-Europe civil aircraft rivalry in this light.

If both states can consume the externalities at stake, and yet these externalities leak out beyond national borders, then the incentive is to free-ride on whatever subsidies the other provides to *its* national champions. In other words, since the external benefits that result diffuse internationally, any subsidies help firms abroad as much as they do domestic ones. States thus hurt each other by spending *too little*, rather than too much. Here, states may seek to cooperate by jointly *increasing* their spending (i.e., practice limited intervention), rather than free-riding (i.e., practicing nonintervention). Chapter 4 explains the U.S.-Japan rivalry in semiconductors this way.

If one state can consume and internalize the externalities at stake, and the other cannot make use of these external benefits, then the former will be expected to purge the industry of competitors abroad, without fear of retaliation. This case has long generated interest in strategic-trade theory, even if the literature has been at a loss to identify conditions under which a foreign state might choose *not* to retaliate. The book predicts when an outcome of this sort is to be expected, revealing why foreign retaliation does not make sense in this case.

If one state can consume but cannot internalize the externalities at stake, and the other is not positioned to make use of these external benefits, then the former has incentive to subsidize its national champion, but with a lesser investment of resources (i.e., practice limited intervention). More to the point, even though the interventionist state

has little to worry about in terms of a fight now, it may one day get a fight if its foreign trade rival can exploit a "late mover" advantage, sharing in technologies the interventionist state helps to underwrite. Chapter 5 describes the U.S.-Japan HDTV rivalry along these lines.

Finally, if neither state can consume or internalize the externalities at stake, then there is no incentive for either to fight for this industry. This is not a trivial outcome; studies of strategic trade typically see the threat of foreign retaliation as the *only* reason why a state might leave the fate of its national champions to the workings of the market (i.e., practice nonintervention), yet this is misleading. Indeed, the book identifies the conditions under which *two* rival states might back away from a fight in high technology, absent any threat of foreign retaliation. More generally, the book argues that nonintervention is a strategic-trade *policy*, rather than a failure of strategic trade.

The book's theory offers new insights into the puzzle of strategic-trade policy. It says that the way in which these commercial rivalries unfold depends on how competing states measure up in terms of being able to make use of the externalities for which they fight, as well as on the scope of these benefits. In certain cases, strategic-trade practices are likely to give rise to heated trade wars, but in other cases to some one-sided battles or to no battle at all.

#### IMPLICATIONS OF THE ARGUMENT

The causes and consequences of trade wars have long been of interest to political scientists and economists alike.<sup>8</sup> As a *cooperation problem* among states, trade wars are among the most salient sources of conflict in international relations. Much of the interest in trade wars traces back to optimal tariff theory, which says that under certain strict conditions, a state can export the cost of curbing imports, and therefore profit from protection.<sup>9</sup> This insight figures prominently in discussions of hegemonic stability theory, for example, and in theories of the political economy of trade more generally.<sup>10</sup> For all the interest, though, the necessary market power to employ an optimal tariff curtails the reach of this theory.<sup>11</sup> Strategic trade theory breathes new life into a similar dynamic, but boasts far greater reach, emphasizing market structure as opposed to market power.<sup>12</sup> It thus brings into play the same "beggar-thy-neighbor" dynamic popularized by optimal tariff theory, but insists that this dynamic is relevant across a wider range of industries. One of the main

goals of this book is to explain when trade wars of this sort are likely to unfold, as well as when they are likely to be resolved cooperatively.

Few observers doubt that externalities carry considerable weight in the state's calculus of strategic trade.<sup>13</sup> And yet, to insist that externalities matter is a point of departure, not an argument. This book offers one of the first systematic arguments about the conditions under which externalities are likely to sway policymakers to fight for national champions in high technology, and with what investment of resources. In this way, the book marks a substantial improvement on the literature, which tends instead to invoke externalities as a way of mopping up any (and all) unexplained variance in strategic trade outcomes.<sup>14</sup> The most important implication of the consumption variable, of course, is that not all national champions exhibiting externalities are worth fighting for, since some promise little payoff for the domestic economy. As argued in Chapter 5, this variable casts considerable doubt on the lessons that have been drawn about the U.S.-Japan rivalry in HDTV.<sup>15</sup> More to the point, and certainly most provocatively, it speaks to the criticism that states lack sufficient information to "pick winners," since in evaluating the score on the consumption variable, states let the *market* pick their winners for them.

The internalization variable provides a second cut at the puzzle of strategic trade. The intuition behind this variable is that the level of resources invested in a national champion depends on whether the payoff is strictly national. If foreign competitors enjoy access to the externalities that result, the incentive is to let others incur the cost of subsidizing their national champions, and to free-ride on these external benefits. To be sure, Avinash Dixit muses that, under these conditions, rivals are likely to retaliate for each other's forays into the market with a "note of thanks."<sup>16</sup> It would be wrong, moreover, to dismiss this as a theoretical quip; this concern proved to be a stumbling block in Washington's debate over funding for the Semiconductor Manufacturing Technology (Sematech) consortium, just as it had in Tokyo's deliberations over the Very Large Scale Integration (VLSI) projects. As argued in Chapter 4, this variable offers a fresh new look at the U.S.-Japan semiconductor rivalry. Put more boldly, by drawing out the implications of the internalization variable, the book can hardly be accused of telling the same old story about chips.

Putting these pieces together, the book's theory has implications for broader questions about the political economy of trade policy. Endoge-

nous protection theory, in particular, has done much to popularize an interest group politics approach to the study of tariffs and nontariff barriers. The underlying argument is that elected officials act on the demands of politically influential constituents, looking for returns at the ballot box.<sup>17</sup> The expectation is thus that protectionism is given to those industries vested with sufficient electoral clout and incentive to lobby.<sup>18</sup> As persuasive as this account is in explaining broader trends in tariffs and nontariff barriers, it falls short in explaining subsidy practices in high technology. Indeed, many high-technology industries that receive subsidies fare poorly on most measures of electoral clout, and some even get more help than they ask for. Other high-technology industries, flush with political capital and highly motivated to lobby, fail to get what they ask for, or fail to get anything at all. The book argues that these patterns are within reach of a state-centered theory of strategic trade, one in which policies in line with the "national interest" prevail over interest group politics, given unique opportunities and constraints that serve to shape trade protectionism in high technology.

#### OUTLINE OF THE BOOK

The book proceeds as follows. Chapter 2 explains and operationalizes the book's theory, takes up issues of evidence and case selection, and sets up a competing explanation with a hold on the case studies presented in the chapters that follow.

Chapters 3 through 5 then present the book's three primary case studies, including the U.S.-Europe civil aircraft rivalry, the U.S.-Japan semiconductor rivalry, and the U.S.-Japan HDTV rivalry. Each case study is divided into three sections: the first looks at the economics of the industry, the purpose of which is to show that an assortment of market imperfections bring the case within reach of strategic-trade theory; the second evaluates the independent variables; the third scores the dependent variable and assesses whether the book's theory does a better job explaining the case than does the competing explanation.

Chapter 3 argues that both the United States and Europe<sup>19</sup> consume and internalize the externalities exhibited by the civil aircraft industry and that, as a result, the temptation is to practice full intervention on behalf of their national champions. This puts them at risk of a trade war, fear of which has long motivated both sides to pursue agreements intended to curb subsidies. In contrast to the competing explanation and



much of the literature on this case, Chapter 3 insists that the heated tone of this commercial rivalry owes to the fact that the states involved, rather than their national champions, have been calling the shots in civil aircraft, and that externalities, rather than votes, are the currency of this fight.

Chapter 4 argues that the United States and Japan consume, but do not internalize, the externalities exhibited by the semiconductor industry. The ease with which these external benefits diffuse beyond national borders has long dampened the enthusiasm on both sides of the Pacific for subsidizing chip vendors. Instead, the incentive in this commercial rivalry has been to free-ride on the help the other gives to its national champions. Cooperation in the semiconductor industry has thus required getting the United States and Japan to spend *more* on their domestic industries, not less. This distinguishes the battle in chips from the battle in civil aircraft, making it clear that the competition in semiconductors is anything but a representative case of “managed” trade.

Chapter 5 argues that the United States could not consume the externalities of HDTV through the 1970s and 1980s, when intervention was hotly debated, whereas Japan has long been able to consume, but not internalize, these external benefits. Since the United States was absent or underrepresented in almost every segment of consumer electronics, HDTV was not a fight worth waging, given the lack of a bridge to semiconductors, displays, and fiber optics, among other industries. In contrast, consumer electronics has paved the way for Japan to leverage these same industries by sponsoring HDTV. Yet, in light of the migration toward digital technologies in consumer electronics, American competitiveness in logic chips, and expectations that most HDTV receivers will be built in export markets, Japanese policymakers were concerned that the United States was poised to exploit a late-mover advantage in this industry, accessing subsidized externalities that diffused beyond that country’s borders. As a result, Japan waged a surprisingly restrained fight against an American industry left to fend for itself.

Chapter 6 revisits the scope of the book’s theory, taking a brief look at three additional cases, including robotics, superconductors, and wheat. Robotics and superconductors are among the most widely anticipated commercial rivalries in high technology, the contours of which should be within reach of the book’s theory. Wheat has also received attention in the strategic-trade literature, although this case is beyond the book’s reach for reasons it can fully explain. Indeed, because the