The Home Market Effect in International Arms Trade

Online Appendix

A Theoretical model: Derivations and proofs

I model two types of goods: a continuum of differentiated civilian industries, whose products are demanded by consumers, and a differentiated military sector, whose goods are demanded by the government exclusively.

There is a large country and a small country. Each has one factor of production: labor. The large country has a mass $L > 1$ of workers, each supplying one unit of labor inelastically and earning wage w. The small country's labor endowment and wage are normalized to 1 (so $w^*L^* = 1$). Each country's military budget ME (ME^*) is extracted from workers through an income tax f (f^*), so that workers will have after-tax income $Y = wL(1-f) = wL - ME$ ($Y^* = 1 - f^* = 1 - ME^*$) to spend on civilian goods, while governments spend ME (ME^*) on military goods.

A.1 Civilian goods industries

Civilian goods are modeled on a continuum, in order to allow for variation in differentiation and transport costs - the two dimensions that will determine which industries display home market effects. In particular, I consider a continuum of monopolistically competitive industries (as introduced by Dixit and Stiglitz, 1977) indexed by $z \in [0, 1]$. Consumers derive utility from purchasing many different varieties of a given product.[1] Each variety is characterized by increasing returns to

[1] This is intuitively appealing at the individual level if the product is food or shoes, but do people really purchase a little bit of every type of car? No, but in this case aggregation saves the argument: each consumer may only purchase one car, but their friends and neighbors will want to differentiate themselves by buying a different brand or model, so once we've aggregated up to the region or country level, consumption patterns are consistent with the love-of-variety approach (see Anderson et al., 1992).

scale, so in equilibrium it will be produced by a single firm. Firms continue to enter until the last firm just breaks even. Since cost structures are identical across firms, in equilibrium all firms have zero profits.

First, I outline the consumers' problem: individuals have Cobb-Douglas preferences over industries, and constant elasticity of substitution (CES) demand over varieties within an industry:

$$U_{\text{consumer}} = \prod_{z\in[0,1]} \left[\left(\sum_{i=1}^{n(z)} q_{zi}^{\frac{\sigma(z)-1}{\sigma(z)}} \right)^{\frac{\sigma(z)}{\sigma(z)-1}} \right]^{\alpha(z)}$$

In the equation above, $\alpha(z)$ is the consumption share of industry z products and $\int_0^1 \alpha(z)dz = 1$; $n(z)$ is the number of product varieties in industry z, $\sigma(z)$ is the elasticity of substitution between varieties (restricted to be larger than one), and q_{zi} is the quantity of variety i in industry z.

Let $\tau(z) > 1$ be the iceberg transport cost incurred in shipping one unit of output from one country to the other, and $x(z) = \tau(z)^{\sigma(z)-1}$ the effective trade cost[2] for industry z.

I will assume there is no international specialization at the industry level, meaning each country produces some goods in each industry. The varieties of industry z are symmetric: let $c(z)$ be the fixed labor requirement, and I normalize the variable labor requirement for each variety to one. Then output and price are the same for all varieties: $q_{zi} = q(z)$, $p_{zi} = p(z)$. As a result of the CES demand specification, the price is a constant markup over marginal cost (in this case, wage w):

$$p(z) = \frac{\sigma(z)}{\sigma(z)-1} w \tag{1}$$

Since free entry drives profits to zero, output is fixed and revenues are proportional to fixed costs:

[2]As in all monopolistic competition models, transport costs matter more for industries with high elasticity of substitution (see for instance Head and Mayer, 2004). The exact specification of x will become obvious shortly in the model derivation.

$\Pi(z) = p(z)q(z) - [c(z)w + qw] = 0$, and we replace $p(z)$ from equation (1) to find:

$$\begin{aligned} q(z) &= c(z)[\sigma(z) - 1] \\ p(z)q(z) &= wc(z)\sigma(z) \end{aligned}$$

A.2 Military goods industry

In deciding how to model demand for military goods, I considered the fact that modern war is multifaceted, and a nation that wishes to defend itself against unknown future threats has to be ready to operate in a variety of battle theaters, using a synergy of weapons. For example, the United States Armed Forces are composed of five separate service branches: Army, Navy, Marine Corps, Air Force, and Coast Guard, each with its own designated area of operations and specialized arsenal. And while there are some common staples, like the M16 rifle, there is also remarkable diversity in the range of weapons employed within and across branches, from submachine guns, to light and heavy machine guns, grenades, rockets, missiles and their launching systems, unmanned vehicles, armored trucks, tanks, helicopters, fighter jets, etc.

I therefore consider the love-of-variety approach to be suited for the arms sector as well, and I use the monopolistic competition model with CES aggregator to represent in reduced form the government's decision over arms purchases. Mathematically, the military goods industry will be characterized by the same variables as any individual civilian industry z. I mark variables of military goods by subscript m.

$$
\begin{aligned}
U_{\text{government}} &= \left(\sum_{i=1}^{n_m} q_{mi}^{\frac{\sigma_m-1}{\sigma_m}}\right)^{\frac{\sigma_m}{\sigma_m-1}} \\
\Rightarrow p_m &= \frac{\sigma_m}{\sigma_m-1}w \\
q_{mi} = q_m &= c_m[\sigma_m-1] \\
p_m q_m &= w c_m \sigma_m
\end{aligned}
$$

A.3 Trade equilibrium

Let Γ be the share of after-taxes income spent by domestic consumers on domestic (civilian) goods, and Γ^* the share of income spent by foreign consumers on domestic goods.

Then the market for each civilian industry z product clears (z's left out for convenience):

$$npq = \alpha Y \Gamma + \alpha Y^* \Gamma^* \tag{2}$$

$$n^* p^* q = \alpha Y(1-\Gamma) + \alpha Y^*(1-\Gamma^*) \tag{3}$$

where
$$\Gamma = \frac{np^{1-\sigma}}{np^{1-\sigma} + n^*(\tau p^*)^{1-\sigma}} = \frac{np^{1-\sigma}}{np^{1-\sigma} + n^*(p^*)^{1-\sigma}x^{-1}}$$
$$\Gamma^* = \frac{n(\tau p)^{1-\sigma}}{n(\tau p)^{1-\sigma} + n^*(p^*)^{1-\sigma}} = \frac{np^{1-\sigma}}{np^{1-\sigma} + n^*(p^*)^{1-\sigma}x}$$

The military goods market clears:

$$\begin{aligned} n_m p_m q_m &= ME\Gamma_m + ME^*\Gamma_m^* \\ n_m^* p_m^* q_m &= ME(1-\Gamma_m) + ME^*(1-\Gamma_m^*) \end{aligned}$$

$$\Gamma_m = \frac{n_m p_m^{1-\sigma_m}}{n_m p_m^{1-\sigma_m} + n_m^*(p_m^*)^{1-\sigma_m} x_m^{-1}}$$

$$\Gamma_m^* = \frac{n_m p_m^{1-\sigma_m}}{n_m p_m^{1-\sigma_m} + n_m^*(p_m^*)^{1-\sigma_m} x_m}$$

A.4 Solving for the trade equilibrium

Each country's income equals the sum of sales revenue from all its civilian and military goods:

$$\begin{aligned} wL = Y + ME &= \left[\int_0^1 n(z)p(z)q(z)dz\right] + n_m p_m q_m \\ 1 = Y^* + ME^* &= \left[\int_0^1 n^*(z)p^*(z)q^*(z)dz\right] + n_m^* p_m^* q_m^* \end{aligned} \tag{4}$$

Let $\tilde{n} = nw$, $\tilde{n}^* = n^*w^* = n^*$. Then, replacing $p(z)q(z) = w(z)c(z)\sigma(z)$, $p^*(z)q(z) = c(z)\sigma(z)$, $p(z) = \frac{\sigma(z)}{\sigma(z)-1}w$ and $p^*(z) = \frac{\sigma(z)}{\sigma(z)-1}$, we can re-write the market clearing conditions (2) and (3) for civilian goods:

$$\begin{aligned} \tilde{n}c\sigma &= \alpha Y \frac{nw^{1-\sigma}}{nw^{1-\sigma} + n^*x^{-1}} + \alpha Y^* \frac{nw^{1-\sigma}}{nw^{1-\sigma} + n^*x} \\ &= \alpha Y \frac{\tilde{n}}{\tilde{n} + \tilde{n}^* w^\sigma x^{-1}} + \alpha Y^* \frac{\tilde{n}}{\tilde{n} + \tilde{n}^* w^\sigma x} \\ (\tilde{n} + \tilde{n}^*)c\sigma &= \alpha(Y + Y^*) \\ \Rightarrow \tilde{n}(z) &= \frac{Yx(z)^2 - w^{\sigma(z)}(Y+Y^*)x(z) + Y^*}{x(z)^2 - (w^{\sigma(z)} + w^{-\sigma(z)})x(z) + 1} \frac{\alpha(z)}{c(z)\sigma(z)} \end{aligned} \tag{5}$$

We do the same for military goods:

$$
\begin{aligned}
\tilde{n}_m c_m \sigma_m &= ME \frac{\tilde{n_m}}{\tilde{n_m} + \tilde{n_m}^* w^{\sigma_m} x_m^{-1}} + ME^* \frac{\tilde{n_m}}{\tilde{n_m} + \tilde{n_m}^* w^{\sigma_m} x_m} \\
(\tilde{n}_m + \tilde{n}_m^*) c_m \sigma_m &= ME + ME^* \\
\Rightarrow \tilde{n}_m &= \frac{ME x_m^2 - w^{\sigma_m}(ME + ME^*) x_m + ME^*}{x_m^2 - (w^{\sigma_m} + w^{-\sigma_m}) x_m + 1} \frac{1}{c_m \sigma_m}
\end{aligned} \tag{6}
$$

We replace the formulas for $\tilde{n}(z)$ and $\tilde{n}_m$ from (5) and (6) into equation (4):

$$
\begin{aligned}
wL = Y + ME &= \left[\int_0^1 n(z) p(z) q(z) dz \right] + n_m p_m q_m \\
&= \left[\int_0^1 \frac{Y x(z)^2 - w^{\sigma(z)}(Y + Y^*) x(z) + Y^*}{x(z)^2 - (w^{\sigma(z)} + w^{-\sigma(z)}) x(z) + 1} \alpha(z) dz \right] + \\
&\quad + \frac{ME x_m^2 - w^{\sigma_m}(ME + ME^*) x_m + ME^*}{x_m^2 - (w^{\sigma_m} + w^{-\sigma_m}) x_m + 1} \\
\Rightarrow 0 &= \int_0^1 \left[\frac{Y x(z)^2 - w^{\sigma(z)}(Y + Y^*) x(z) + Y^*}{x(z)^2 - (w^{\sigma(z)} + w^{-\sigma(z)}) x(z) + 1} - Y \right] \alpha(z) dz + \\
&\quad + \left[\frac{ME x_m^2 - w^{\sigma_m}(ME + ME^*) x_m + ME^*}{x_m^2 - (w^{\sigma_m} + w^{-\sigma_m}) x_m + 1} - ME \right]
\end{aligned}
$$

The equilibrium condition is then:

$$
0 = \int_0^1 \alpha(z) g(z) dz + g_m \tag{7}
$$

$$
\text{where} \quad g(z) = \left[\frac{Y}{x(z) w^{\sigma(z)} - 1} - \frac{Y^*}{x(z) w^{-\sigma(z)} - 1} \right] \tag{8}
$$

$$
g_m = \left[\frac{ME}{x_m w^{\sigma_m} - 1} - \frac{ME^*}{x_m w^{-\sigma_m} - 1} \right] \tag{9}
$$

To build the intuition behind this condition, note that the function $g(z)$ (or g_m) is positive if and only if Home is a net exporter of good z (or m). In equilibrium trade is balanced, so Home will be a net exporter of some goods, but not others. The question at hand is whether the model's prediction about which sectors fall into each category is in accordance with empirical evidence.

Both $g(z)$ and g_m are strictly decreasing in w, so equation (7) has a unique solution $w > 1$, as long as $\left[(Y - Y^*) \int_0^1 \frac{\alpha(z)dz}{x(z)-1} + (ME - ME^*)\frac{1}{x_m - 1}\right] > 0$, a sufficient condition for which is that both the civilian and military sectors of the big country are larger than those of the small country. The proof follows:

A.5 Existence of a unique solution

For simplicity, I assume $\min[x(z)^{1/\sigma(z)}] < x_m^{1/\sigma_m} < \max[x(z)^{1/\sigma(z)}]$ - in other words, that the military sector is not at an extreme in terms of this measure combining effective trade costs x and elasticity of substitution σ. This is a reasonable assumption in theory, and it is also holds empirically for the freight rate and σ values I use.[3]

I then show that there exists a unique solution to equation 7, and that this solution is reached for w in the interval $1 < w < \min[x(z)^{1/\sigma(z)}]$. The intuition for having $w > 1$ in equilibrium is that large country producers have easy access to the larger market, so they incur lower transportation costs. If production costs were also lower, no producers would wish to locate in the small country.

Existence

Denote the right hand side of equation 7 by $R(w)$. Assuming $Y > Y^*$ and $ME > ME^*$, the following conditions are met, ensuring existence of an equilibrium for $1 < w < \min[x(z)^{1/\sigma(z)}]$:

i. $R'(w)$ exists everywhere on the open interval $(1, \min[x(z)^{1/\sigma(z)}])$, and $R'(w) < 0$. This is straightforward to verify.

[3]Recall $x^{1/\sigma} = \tau^{1-1/\sigma} = (1 + \text{freight rate})^{1-1/\sigma}$. Using freight rate estimates from Hanson and Xiang (2004) and elasticity estimates from Broda and Weinstein (2006), I verify that indeed the military sector is in the interior of the civilian industries range in terms of $x^{1/\sigma}$.

ii. $R(1) = \int_0^1 \alpha(z) \frac{Y - Y^*}{x(z) - 1} dz + \frac{ME - ME^*}{x_m - 1} > 0$.

iii. As w rises toward $\min[x(z)^{1/\sigma(z)}]$, R(w) approaches $-\infty$.

Therefore $R(w)$ must intersect the zero axis for a unique w between 1 and $\min[x(z)^{1/\sigma(z)}]$.

Uniqueness

For all positive intervals excluding $1 < w < \min[x(z)^{1/\sigma(z)}]$, I show that equation (7) cannot hold.

i. If $w > \max[x(z)^{1/\sigma(z)}]$, it is easy to verify that $R(w) > 0$.

ii. If $\min[x(z)^{1/\sigma(z)}] < w < \max[x(z)^{1/\sigma(z)}]$, $R(w)$ is ill-defined, since $\exists z$ so that $x(z) - w^{\sigma(z)} = 0$.

iii. Recall that $R(1) > 0$ and $R'(w) < 0$. Then as w decreases from 1 and approaches $\max[x(z)^{-1/\sigma(z)}]$, $R(w)$ increases monotonically towards ∞. Therefore $R(w)$ cannot intersect the axis on this interval.

iv. If $\min[x(z)^{-1/\sigma(z)}] < w < \max[x(z)^{-1/\sigma(z)}]$, $R(w)$ is ill-defined, since $\exists z$ so that $x(z)w^{\sigma(z)} - 1 = 0$.

v. $R(0) = -Y - ME < 0$. As w approaches $\min[x(z)^{-1/\sigma(z)}]$ from below, $R(w)$ falls monotonically towards $-\infty$.

In the next section I will show that functions $g(z)$ and g_m code the trade-offs in the strategic decision over location faced by firms, and they are the key to whether a certain industry displays home market effects or not.

A.6 Home market effect (HME)

A typical formulation for HME (as in Hanson and Xiang, 2004) is that industry z displays home market effects if the large country's share of varieties of z produced globally exceeds its share of world factor supplies; however, this is after assuming an identical demand structure across countries, which does not apply here.

Going back to the classic (Krugman, 1980) formulation, the home market effect arises from differences in demand, aside from (or instead of) country size. In the present paper, as in Krugman's seminal 1980 AER paper, preferences are not identical: demand *within* the civilian and military sectors follows the same pattern across countries, but governments idiosyncratically dictate how income is allocated *across* these two sectors. Therefore I develop a more general definition on the home market effect, which subsumes the Hanson and Xiang (2004) definition in the special case where demand is identical across countries.

Definition - home market effect

Industry z is said to display the home market effect if the country with higher demand for z produces a larger share of world z output than its share of world demand for z. In my 2-country world, that translates to:

a) For civilian industries indexed by z: $\frac{n(z)p(z)q(z)}{n^*(z)p^*(z)q(z)} = \frac{n(z)w}{n^*(z)} > \frac{\alpha(z)Y}{\alpha(z)Y^*} = \frac{Y}{Y^*}$.

Define $\tilde{n}(z) = n(z)w$. Then the condition is $\tilde{n}(z)/\tilde{n}^*(z) > \frac{Y}{Y^*}$ or $n(z)/n^*(z) > \frac{Y/w}{Y^*}$.[4]

b) Under the assumption that the larger country (Home) also has higher military expenditure $(ME > ME^*)$[5], the military sector displays the home market effect if and only if $\tilde{n}_m/\tilde{n}^*_m > \frac{ME}{ME^*} \Leftrightarrow n_m/n^*_m > \frac{ME/w}{ME^*}$.

In terms of the function $g(z)$, I find that an industry z displays the home market effect if and

[4]Note that if demand is forced to be the same across countries, we have: $\frac{Y/w}{Y^*} = \frac{wL/w}{w^*L^*} = L$, so the home market effect condition simplifies to the typical formulation that the large country's share of varieties of z exceeds its share of the world factor supplies: $n(z)/n^*(z) > L$

[5]Now it becomes clear why it is helpful to limit the discussion to a sample of country pairs in which the larger country also has higher military expenditure: otherwise the prediction of how production varies with ME/ME^* flips.

only if $g(z) > 0$.

$$\begin{aligned}
\text{Let } h(z) &= \frac{\tilde{n}(z)}{\tilde{n}(z)^*} \\
\text{We know } (\tilde{n}(z) + \tilde{n}(z)^*)c(z)\sigma(z) &= \alpha(Y + Y^*) \\
\Rightarrow \frac{h(z)}{h(z)+1}(Y + Y^*) &= \frac{\tilde{n}(z)c(z)\sigma(z)}{\alpha} \\
(Y + Y^*)\left[\frac{h(z)}{h(z)+1} - \frac{Y}{Y+Y^*}\right] &= \frac{\tilde{n}(z)c(z)\sigma(z)}{\alpha} - Y \\
&= g(z) \\
\text{So } h(z) = \frac{\tilde{n}(z)}{\tilde{n}^*(z)} > \frac{Y}{Y^*} &\Leftrightarrow g(z) > 0 \qquad (10)
\end{aligned}$$

Similarly, the military sector displays the home market effect if and only if $\tilde{n}_m/\tilde{n}_m^* > \frac{ME}{ME^*} \Leftrightarrow g_m > 0$.

To see the intuition behind this result, note that the g function reflects the trade-off between production costs (represented by w^σ) and trade costs (represented by $x = \tau^{\sigma-1}$):

$$\begin{aligned}
g(z) &> 0 \\
\Leftrightarrow \frac{Y}{x(z)w^{\sigma(z)} - 1} &> \frac{Y^*}{x(z)w^{-\sigma(z)} - 1} \qquad (11)
\end{aligned}$$

Equation (11) shows the tradeoffs faced by a civilian firm that produces a variety of good z as it considers relocating from the small to the large country: the left hand side portrays the benefits of relocation (higher for a larger Home market, smaller with a higher production cost $w^{\sigma(z)}$), while the right hand side shows the costs of relocation. The industry will show home market effects if the benefits of relocation exceed the costs.

High-x and low-σ industries have relatively high g and so are more likely to display the home market effect. Assuming military expenditure is small relative to GDP for all countries, there will be some civilian industries for which $g(z) > 0$ and some for which $g(z) < 0$. The following result from Hanson and Xiang (2004) holds for civilian sectors:

> Let z_0 be a civilian industry so that $g(z_0) > 0$; then $g(z_1) > 0$ for all z_1 such that $x(z_1) \geq x(z_0)$ and $\sigma(z_1) \leq \sigma(z_0)$. Conversely, if $g(z_0) < 0$ for some z_0, then $g(z_1) < 0$ for all z_1 such that $x(z_1) \leq x(z_0)$ and $\sigma(z_1) \geq \sigma(z_0)$.

In other words, if a civilian industry shows home market effects, so will all industries that have at least as high effective trade costs and are at least as differentiated.

In addition to this, $g(z)$ decreases monotonically with σ for all parameter values, and increases with x as long as an additional condition is met.[6]

In comparing the $g()$ functions of two civilian industries z and z_0, the only parameters of interest were the effective trade cost $x(z)$ and elasticity of substitution $\sigma(z)$. However, as I extend this result to the military sector, and compare g_m to $g(z_0)$, the set of parameters extends by the relative ratio of military spending out of GDP - remember the equilibrium condition:

$$0 = Y \int_0^1 \left[\frac{1}{x(z)w^{\sigma(z)} - 1} - \frac{Y^*/Y}{x(z)w^{-\sigma(z)} - 1} \right] \alpha(z)dz + ME \left[\frac{1}{x_m w^{\sigma_m} - 1} - \frac{ME^*/ME}{x_m w^{-\sigma_m} - 1} \right]$$

Whether $g_m > 0$ or $g_m < 0$ depends on how transport costs and the elasticity of substitution compare across sectors, but also on military and civilian budgets in the two countries: e.g. if $ME/ME^* \gg Y/Y^*$ the military sector is much more likely to display the home market effect.

[6]The condition is that the two countries are not too different in size, or that effective trade costs are not too high: $Y/Y^* < \frac{(x(z)w^{\sigma(z)}-1)^2}{(x(z)-w^{\sigma(z)})^2}$. But a similar condition is built in implicitly in the assumption of incomplete specialization: if one country were much larger than the other, then at least some high transport cost industries would locate exclusively in the large market.

Proposition 1

Let z_0 be a civilian industry so that $g(z_0) > 0$; then $g_m > 0$ if $x_m \geq x(z_0)$, $\sigma_m \leq \sigma(z_0)$, and $ME/ME^* \geq Y/Y^*$. In particular, I isolate two cases:

(a) $x_m > x(z_0)$, $\sigma_m < \sigma(z_0)$, and $ME/ME^* \geq Y/Y^*$

(b) $x_m \approx x(z_0)$, $\sigma_m \approx \sigma(z_0)$, and $ME/ME^* \geq Y/Y^*$

The reverse also holds: if $g(z_0) < 0$ for some z_0, then $g_m < 0$ if $ME/ME^* \leq Y/Y^*$, $x_m \leq x(z_0)$ and $\sigma_m \geq \sigma(z_0)$.

Proposition 1 states that if a civilian industry z_0 shows home market effects, so will the military industry, as long as the military sector has at least as high effective trade costs and is at least as differentiated as z_0, and as long as Home's military spending relative to Foreign is higher than Home's civilian spending. This last condition that $ME/ME^* \geq Y/Y^*$ is equivalent to $f \geq f^*$,[7] in other words Home has a higher military income tax.

As we switch from comparing two civilian industries to comparing military vs. civilian goods, the key difference is that home market effects can arise not just from differences in goods' characteristics, but also from differences in relative demand for military vs. civilian goods (as shown in part b of proposition 1). The military sector is much more likely to display home market effects if Home has higher military spending relative to GDP than Foreign.

A.7 Empirical specification

The empirical approach is a double-difference, comparing two goods exported by two countries to a common importer.

[7] Since $ME/ME^* \geq Y/Y^* \Leftrightarrow ME/Y \geq ME^*/Y^* \Leftrightarrow \frac{ME}{wL(1-f)} \geq \frac{ME^*}{1-f^*} \Leftrightarrow \frac{f}{1-f} \geq \frac{f^*}{1-f^*} \Leftrightarrow f \geq f^*$

Let τ_{ijk} be iceberg transport costs for industry i between countries j and k, and assume the following form: $\tau_{ijk} = d_{jk}^{\gamma_i}$, where $\gamma_i > 0$ and d_{jk} is the distance between j and k.

Total sales in industry $i \in \{z, m\}$ by country j to country k are:

$$\begin{aligned}
\text{for civilian industries: } S_{zjk} &= \alpha_z Y_k n_{zj} \left(\frac{P_{zjk}}{P_{zk}}\right)^{1-\sigma_z} \\
\text{for military: } S_{mjk} &= ME_k n_{mj} \left(\frac{P_{mjk}}{P_{mk}}\right)^{1-\sigma_m}
\end{aligned}$$

where P_{ijk} is the delivered c.i.f. (including cost, insurance, freight) price in country k of a good from industry i produced in country j, and P_{ik} is the CES price index for industry i in country k.

$$\begin{aligned}
P_{ijk} &= P_{ij} t_{ijk} (d_{jk})^{\gamma_i} \\
&= \left(\frac{\sigma_i}{\sigma_i - 1}\right) w_{ij} t_{ijk} (d_{jk})^{\gamma_i}
\end{aligned}$$

where P_{ij} is the f.o.b. (free-on-board) price of a product in industry i manufactured in country j, t_{ijk} is (1 + ad-valorem tariff in k on imports of i from j), w_{ij} is the unit production cost of i in country j, and d_{jk} is the distance between countries j and k.

Compare country j's exports of good i to country k with some other country h's exports.

$$\begin{aligned}
\frac{S_{ijk}}{S_{ihk}} &= \frac{n_{ij}}{n_{ih}} \left(\frac{w_{ij}}{w_{ih}}\right)^{1-\sigma_i} \left(\frac{d_{jk}}{d_{hk}}\right)^{(1-\sigma_i)\gamma_i} \\
&= \frac{\tilde{n}_{ij}}{\tilde{n}_{ih}} \left(\frac{w_{ij}}{w_{ih}}\right)^{-\sigma_i} \left(\frac{d_{jk}}{d_{hk}}\right)^{(1-\sigma_i)\gamma_i}
\end{aligned} \tag{12}$$

Equation (12) implicitly assumes that countries j and h face common tariffs in country k.

Note that in this first difference the variables specific to civilian vs. military sectors $(\alpha(z), Y, ME)$ have already been eliminated, so next in the double-difference there is no reason we cannot compare the military as a treatment industry with a low-transport cost, high-substitution elasticity civilian sector as the control industry.

Let i be the treatment industry (low substitution elasticity and high transport costs) and o the control industry (high substitution elasticity and low transport costs). Then, applying another difference to equation (12), I obtain:

$$\frac{S_{ijk}/S_{ihk}}{S_{ojk}/S_{ohk}} = \frac{\tilde{n}_{ij}/\tilde{n}_{ih}}{\tilde{n}_{oj}/\tilde{n}_{oh}} \frac{(w_{ij}/w_{ih})^{-\sigma_i}}{(w_{oj}/w_{oh})^{-\sigma_o}} (d_{jk}/d_{hk})^{(1-\sigma_i)\gamma_i-(1-\sigma_o)\gamma_o} \tag{13}$$

Double-difference, two civilian industries

Equation (13) and result (10) suggest the following regression for when both i and o are civilian industries:

$$ln\left(\frac{S_{ijk}/S_{ihk}}{S_{ojk}/S_{ohk}}\right) = \alpha + \beta \ln(Y_j/Y_h) + \phi(X_j - X_h) + \theta ln(d_{jk}/d_{hk}) + \epsilon_{iojkh} \tag{14}$$

where Y_j and Y_h represent civilian expenditure in the two countries. Since in my sample the median military expenditure level is just under 2% of GDP, I approximate civilian expenditure Y by GDP: $Y = GDP - ME \approx GDP$. This will make results easier to interpret, especially given that military spending is often reported and discussed as a percentage of GDP. X_j and X_h control for production costs of industries i and o in the two exporter countries, and d_{jk} and d_{hk} are distances from each of the exporters to the common importer

To see how I obtained equation (14), imagine an experiment in which we randomly draw the relative size of the two countries. Then when $Y_j > Y_h$, $\frac{\tilde{n}_{ij}/\tilde{n}_{ih}}{\tilde{n}_{oj}/\tilde{n}_{oh}} > 1$, whereas when $Y_j < Y_h$, $\frac{\tilde{n}_{ij}/\tilde{n}_{ih}}{\tilde{n}_{oj}/\tilde{n}_{oh}} < 1$. In other words, $\ln\left(\frac{\tilde{n}_{ij}/\tilde{n}_{ih}}{\tilde{n}_{oj}/\tilde{n}_{oh}}\right)$ varies positively with $\ln(Y_j/Y_h)$.

Thus, equation (14) simplifies to the Hanson and Xiang (2004) specification:[8] in this scenario, we test for home market effects by examining whether bigger countries export relatively more highly differentiated, expensive to ship goods - i.e. $\beta > 0$. This estimation approach uses the fact that the exporter pair is not ordered by size, so that $\ln(Y_j/Y_h)$ can take both positive and negative values.

Double-difference, military vs. civilian industries

My contribution is in allowing for a comparison of goods across sectors with different demand. If industry i is military and o is a civilian industry of equal or lower transport costs and equal or higher σ, proposition 1 suggests that $\frac{\tilde{n}_{ij}/\tilde{n}_{ih}}{\tilde{n}_{oj}/\tilde{n}_{oh}}$ will be increasing in $\frac{ME_j/ME_h}{Y_j/Y_h}$. That result was obtained under the condition that $Y_j > Y_h$ and $ME_j > ME_h$, therefore I order exporter pairs so that the first exporter (j) is larger, and I restrict the sample so that exporter j's military expenditure is also larger than that of exporter h.[9] I then estimate the regression:

$$ln\left(\frac{S_{ijk}/S_{ihk}}{S_{ojk}/S_{ohk}}\right) = \alpha + \beta \ln\left(\frac{ME_j/ME_h}{Y_j/Y_h}\right) + \phi(X_j - X_h) + \theta ln(d_{jk}/d_{hk}) + \epsilon_{iojkh} \qquad (15)$$

where $\frac{ME_j/ME_h}{Y_j/Y_h}$ is the relative military spending out of GDP of the two exporters, and again X_j and X_h control for the production costs of industries i and o in the two exporter countries, and d_{jk} and d_{hk} are distances from each of the exporters to the common importer. A positive β coefficient is evidence of the home market effect.

Civilian goods o are the *control* goods with lower transport costs and higher elasticity of substitution. I expect the β coefficient to be positive and significant.

[8] Intuitively, this is because when comparing two civilian goods against each other, I implicitly restrict relative demand for the two goods to be identical across countries.

[9] I order exporter pairs and restrict the sample in this way in order to fully accord with the theoretical model setup. Empirical results are not significantly altered.

B Determinants of military expenditure

My empirical strategy relies on the assumption that military expenditure is exogenous to economic considerations which might influence arms and civilian goods exports.

Several authors have previously examined the determinants of military spending: **?** finds that the ratio of military expenditure and GDP increases moderately with GDP, but only at low levels of income; involvement in a conflict, form of government and geographical variables are more reliable determinants. Sandler and Hartley (1995) model the demand for military expenditure empirically as influenced by GDP, allies' and enemies' expenditures, and taking part in a conflict, but estimate the model on a country-by-country basis, thus acknowledging that country-specific preferences explain much of the variation. Chowdhury (1991) uses Granger tests, but finds no general causal relationship between GNP and military spending as a share of GNP across countries. Several other studies also fail to find a clear pattern of Granger causality between economic variables and military spending, as noted by Smith (1995), who also demonstrates the persistent nature of military spending in country-by-country regressions.

My own brief analysis is consistent with earlier findings. Table (1) shows regressions over the 23-year unbalanced panel, for the 3 samples I consider in the main analysis: the top 60 countries by GDP, the top 30, and high income OECD countries respectively. For each sample, I first regress military spending as a share of GDP[10] on logged GDP per capita, form of governance, and conflict indicators. The follow-up regressions include country fixed effects and the previous year's military spending. All regressions account for year fixed effects, since this time period captures a significant downward trend in spending worldwide.

[10] I consider the natural log of military expenditure and GDP in this analysis, in order to limit the influence of single country outliers like the United States, and because the main analysis is in logarithmic terms. Results are the same in levels.

I find some positive correlation between military expenditure and income, but not once we limit the sample to high income OECD countries, and not once we account for country fixed effects. Overall, it appears that richer countries can afford to spend a larger share of their GDP on the military. This correlation is due to variation across, not within countries, as columns 2, 4 and 6 illustrate. This suggests that business cycles don't, on average, drive military spending.

Form of governance matters: higher Polity score predicts lower military spending - columns 1, 3, and 5 show that democracies spend less, autocracies more. But this pattern is wiped out (and even reversed in the top 30 sample) once we control for country fixed effects - so when a country becomes more democratic it spends no less, and possibly a little *more*, on its army.

Finally, spending is higher for countries in conflict - both minor and severe. When we introduce lagged expenditure and country fixed effects, this effect is reduced and even becomes insignificant for the largest sample, suggesting that long-lasting regional tensions influence military spending more than individual outbursts of violence.

Regression 4 indicates that a large country will on average spend 7% more on its military during a year when it is involved in an armed conflict, as compared to a year when it is at peace. Interestingly, the magnitude of the effect is similar for the two different conflict intensity levels.

I find only weak evidence that surrounding conflicts are associated with higher military expenditure (see columns 1, 3 and 5). This correlation completely disappears once we control for country fixed effects.

To summarize, this analysis has revealed that military spending is driven by historical patterns and country-specific preferences, as well as conflict involvement, but *not* by business cycle fluctuations, and very little or not at all by changes in the Polity index.

Table 1: Determinants of military expenditure in the baseline analysis samples

	Top 60		Top 30		High income OECD	
	(1)	(2)	(3)	(4)	(5)	(6)
Lag of ln(ME/GDP)		.73 (.06)***		.74 (.08)***		.86 (.03)***
ln(GDP per capita)	.15 (.06)***	-.005 (.04)	.20 (.09)**	.03 (.04)	-.29 (.19)	-.09 (.10)
Polity score	-.04 (.01)***	.001 (.003)	-.05 (.03)*	.007 (.002)***	-.16 (.08)**	.01 (.01)
Conflict indicator						
Minor (25-1000 deaths)	.51 (.19)***	.03 (.02)*	.55 (.21)***	.07 (.02)***	.97 (.21)***	.06 (.03)**
Severe (1000+ deaths)	.70 (.11)***	.02 (.02)	.96 (.20)***	.07 (.03)**	.74 (.17)***	.05 (.03)*
Neighboring conflict						
Minor (25-1000 deaths)	.03 (.09)	.005 (.01)	.03 (.15)	-.004 (.01)	.26 (.15)*	-.003 (.02)
Severe (1000+ deaths)	.19 (.12)*	-.02 (.02)	.31 (.20)	-.009 (.02)	.22 (.16)	-.02 (.03)
Country fixed effects		Yes		Yes		Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	1,308	1,297	685	682	506	505
R^2	.28	.97	.3	.98	.37	.99

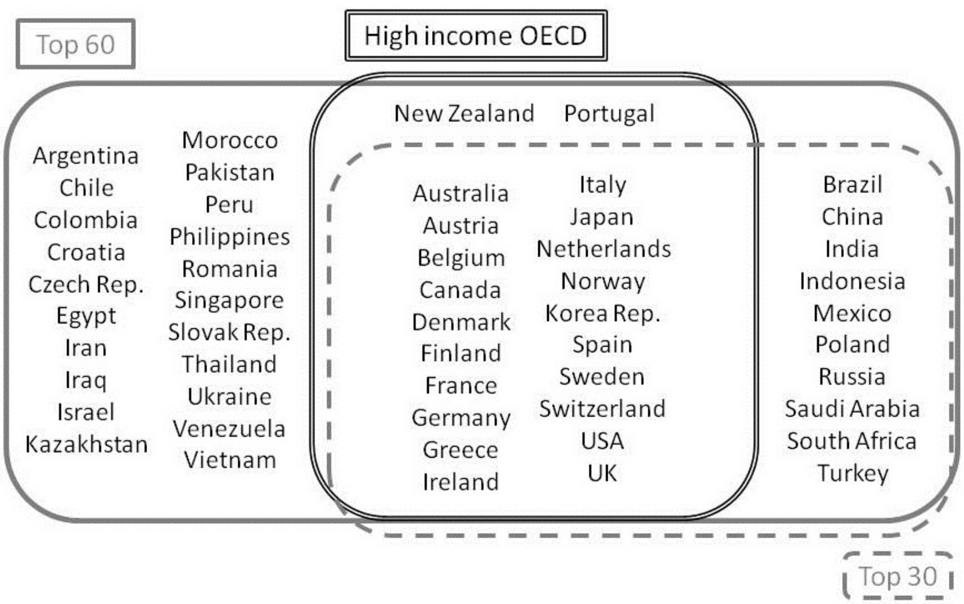
Notes: dependent variable = ln(ME/GDP), and the unit of observation is a country in a given year. *Polity score* takes values from -10 (most autocratic) to 10 (most democratic). *Conflict* and *neighboring conflict* are 0-1 indicators. Standard errors are clustered at the country level, and significance indicated is at 10%(*), 5%(**), and 1%(***).

C Appendix: List of countries and goods

C.1 Countries in the sample

Figure 1 illustrates the three samples of exporters presented in estimation results. The set of importers used throughout is a the sub-sample of large to medium countries (in the top 60) that are both EU and NATO members, and that are high income OECD countries by the World Bank's 2005 classification, as discussed in Appendix D.1.

Figure 1: Exporters included in the three baseline samples



C.2 Goods in the sample

Table 2 lists the military goods employed in the analysis (after exclusion of non-military weapons). The table distinguishes between higher and lower differentiation goods, although all are included in the baseline estimation.

Table 2: Arms and ammunition subcategories included in the baseline

SITC rev 3	Category description
89111^{d}	*Tanks and other armoured fighting vehicles, motorized, whether or not fitted with weapons, and parts of such vehicles*
89112^{d}	*Military weapons (other than revolvers, pistols)*
89113	Swords, cutlasses, bayonets, lances and similar arms, and parts thereof
89114	Revolvers and pistols
89124^{h}	**Other cartridges and parts thereof (not for tools or shotguns)**
89129^{d}	*Munitions of war and parts thereof (includes bombs, grenades, torpedoes, mines, missiles and similar munitions of war)*
89191	Parts and accessories of revolvers or pistols
89199	Parts and accessories, n.e.s.

Note: Superscript ^{d} and *italics* mark highly differentiated goods, while superscript ^{h} and **bold font** mark goods that are relatively less differentiated (more homogeneous).

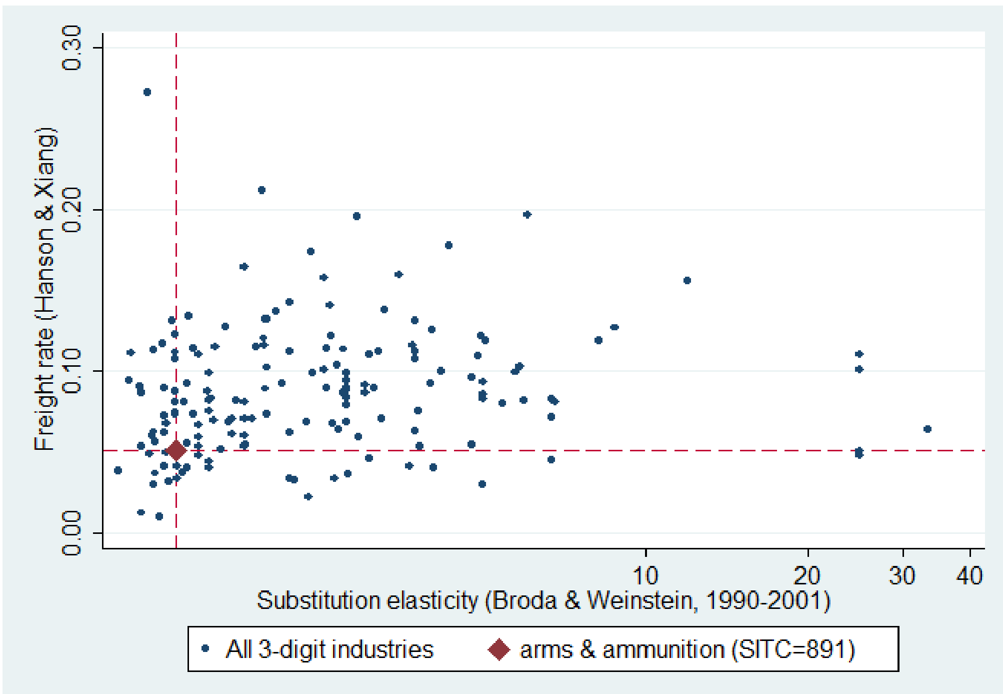


Figure 2: Substitution elasticity and freight rate of arms vs. other industries

The arms and ammunition category is characterized by high differentiation, but relatively low transport costs: it falls within decile 2 of both elasticitiy of differentiation σ and the freight rate (see figure 2). The empirical comparison is done against so-called *control* goods - goods that are cheaper to ship and less differentiated than military weapons, and so are expected to display lower home market effects. I isolate a set of 16 industries that can be used as controls - these have lower freight rate and higher substitution elasticity σ than arms and ammunition, but lie outside of an immediately adjacent radius.[11]

Using figure (2) as reference control goods lie in the South-East quadrant relative to arms in the (σ, freight rate) coordinates. From the industries that met this requirement, I eliminated aircraft (since they include military planes) and engines (this category includes jet engines, which are used for military jet fighters, guided missiles and unmanned aerial vehicles). The remaining control goods are listed in table 3.

Table 3: Set of *control* goods - less differentiated, cheaper to transport than arms

	SITC rev 3 description	freight rate	σ
514	Nitrogen-function compounds	0.0475	1.48
515	Organo-inorganic compounds	0.0404	1.55
525	Radioactive and associated materials	0.0331	1.35
531	Synthetic organic coloring matter	0.0504	25.03
542	Medicaments	0.0338	2.65
683	Nickel	0.0402	4.04
687	Tin	0.0409	3.65
746	Ball or roller bearings	0.0512	1.63
752	Computers	0.0333	2.18
761	TV receivers	0.0364	2.8
782	Motor vehicles for the transport of goods	0.0445	6.7
874	Measuring and analysing instruments	0.0440	1.55
881	Photographic apparatus and equipment, n.e.s.	0.0477	1.48
896	Works of art, collectors' pieces and antiques	0.0323	2.23

[11] I require control goods to be outside a 30% radius of the weapons category, as measured in the Euclidean (σ-1;freight rate) space.

D Appendix: Additional results and robustness checks

D.1 Selecting the set of importers

Table 4 tests different ways to restrict the sample of importers. In all these regressions, the set of *exporters* is made up of the top 60 countries (by 2005 GDP). The base sample of *importers* (in column 1) is also composed of the top 60 countries. The other columns consider different sub-samples of importers (but continue to exclude countries that are below the top 60).

Column 2 requires that importers are NATO members (during the year of trade); column 3 limits importers to high income OECD countries (as classified by the World Bank in 2005); column 4 considers only importers that are both NATO members and high income OECD countries; column 5 restricts importers to EU countries. Finally, column 6 is the most restrictive and requires that importers are high income OECD countries, and members of both NATO and EU.[12]

[12] In this last sample, which is used as the baseline in the paper, importers are: Belgium, Denmark, France, Germany, Greece, Italy, Netherlands, Portugal, Spain, and United Kingdom.

Table 4: OLS estimation results over different samples of importers

importer is in:	no restriction	NATO	OECD	NATO,OECD	EU	NATO,OECD,EU
	(1)	(2)	(3)	(4)	(5)	(6)
ln(ME/GDP)	1.56 (.09)***	1.50 (.09)***	1.47 (.09)***	1.45 (.09)***	.80 (.10)***	.85 (.09)***
distance	.23 (.03)***	-.19 (.05)***	.20 (.03)***	-.07 (.05)	-.38 (.05)***	-.36 (.05)***
colonial relationship	-.04 (.08)	.34 (.09)***	-.23 (.09)**	.21 (.10)**	-.20 (.09)**	-.09 (.11)
common language	-.17 (.09)*	-.33 (.11)***	.17 (.10)*	-.25 (.11)**	.05 (.10)	.02 (.11)
common border	.41 (.06)***	.13 (.08)	.42 (.07)***	.09 (.09)	.40 (.08)***	.28 (.09)***
religious similarity	1.22 (.12)***	1.28 (.15)***	1.26 (.14)***	1.48 (.14)***	.80 (.13)***	1.11 (.14)***
Polity similarity	-.23 (.05)***	-.70 (.20)***	-.78 (.19)***	-1.10 (.21)***	-.18 (.23)	-.40 (.23)*
UNGA affinity	.16 (.14)	.12 (.19)	.10 (.19)	.26 (.19)	-1.75 (.21)***	-1.65 (.20)***
capital/worker	-.21 (.09)**	-.12 (.09)	-.06 (.09)	-.17 (.09)*	.20 (.09)**	.02 (.08)
land/worker	.44 (.03)***	.50 (.03)***	.47 (.03)***	.49 (.03)***	.50 (.03)***	.48 (.03)***
years schooling	.30 (.25)	-.30 (.26)	-.18 (.25)	-.42 (.25)*	-.60 (.27)**	-.33 (.26)
Polity score	.08 (.01)***	.16 (.03)***	.17 (.03)***	.23 (.04)***	.07 (.04)*	.10 (.04)**
NATO member	.08 (.11)	-.09 (.10)	.13 (.10)	.12 (.10)	-.64 (.10)***	-.39 (.10)***
EU member	.59 (.11)***	.11 (.11)	.46 (.11)***	.14 (.11)	.05 (.11)	.04 (.11)
Obs.	222,469	121,927	152,911	102,131	92,587	62,914
e(N-clust)	1516	1504	1514	1504	1426	1423
R^2	.14	.15	.14	.15	.14	.15

Notes: The unit of observation is a pair of exporters j and h, a common importer k, and a year. Dep. variable $= \ln\left(\frac{S_{mjk}/S_{mhk}}{S_{ojk}/S_{ohk}}\right)$: flow of military goods (m) from exporters j and h to importer k, vs. flows of control goods (o). Control variables are as described in the main text. The set of exporters is composed of the 60 largest economies. Importers are the top 60 largest economies, restricted by membership into NATO, EU, and the set of high income OECD countries. Year and importer country dummies are included in all regressions, and standard errors are clustered at the exporter-pair level. Significance indicated is at 10%(*), 5%(**), and 1%(***).

D.2 Robustness to selection of exporters

Tables 5, 6, and 7 test robustness to dropping the largest exporters in the sample.[13] I find no significant deviations of the main coefficient from the baseline results.

Table 5: Sensitivity to dropping the 6 largest exporters, top 60 sample

		Excluding exporter (one at a time):					
	baseline	USA	Germany	Canada	UK	France	Israel
ln(ME/GDP)	.85 (.09)***	.88 (.10)***	.90 (.09)***	.89 (.10)***	.87 (.10)***	.87 (.10)***	.96 (.10)***
distance	-.36 (.05)***	-.33 (.05)***	-.39 (.05)***	-.37 (.05)***	-.36 (.05)***	-.33 (.05)***	-.37 (.05)***
colonial relationship	-.09 (.11)	-.03 (.13)	-.08 (.11)	-.08 (.12)	-.07 (.12)	-.08 (.12)	-.09 (.12)
common language	.02 (.11)	-.004 (.12)	.07 (.11)	-.04 (.11)	.03 (.11)	.06 (.11)	.07 (.11)
common border	.28 (.09)***	.29 (.10)***	.12 (.09)	.28 (.10)***	.23 (.10)**	.31 (.10)***	.26 (.09)***
religious similarity	1.11 (.14)***	1.12 (.15)***	1.13 (.14)***	1.16 (.14)***	1.09 (.15)***	1.06 (.15)***	1.10 (.14)***
Polity similarity	-.40 (.23)*	-.32 (.23)	-.43 (.23)*	-.39 (.23)*	-.42 (.23)*	-.38 (.24)	-.48 (.23)**
UNGA affinity	-1.65 (.20)***	-.78 (.25)***	-1.73 (.20)***	-1.72 (.21)***	-1.65 (.21)***	-1.65 (.21)***	-1.75 (.22)***
capital/worker	.02 (.08)	-.06 (.08)	.15 (.08)*	.04 (.09)	.006 (.08)	.01 (.08)	.02 (.08)
land/worker	.48 (.03)***	.48 (.03)***	.52 (.03)***	.45 (.03)***	.48 (.03)***	.48 (.03)***	.47 (.03)***
years schooling	-.33 (.26)	-.54 (.27)**	-.77 (.26)***	-.39 (.26)	-.36 (.26)	-.31 (.26)	-.24 (.26)
Polity score	.10 (.04)**	.08 (.04)*	.11 (.04)***	.10 (.04)**	.10 (.04)**	.09 (.04)**	.12 (.04)***
NATO member	-.39 (.10)***	-.56 (.11)***	-.44 (.10)***	-.49 (.11)***	-.38 (.11)***	-.37 (.11)***	-.47 (.11)***
EU member	.04 (.11)	.13 (.11)	-.10 (.11)	.11 (.11)	.10 (.11)	.11 (.11)	.05 (.11)
Obs.	62914	57620	58974	58742	58715	58792	60378
e(N-clust)	1423	1368	1369	1368	1368	1368	1386
R^2	.15	.14	.16	.14	.15	.15	.15

Notes: Column 1 shows baseline OLS results for the top 60 sample of exporters. Column 2 drops observations where the US is one of the exporters. Column 3 drops observations where Germany is an exporter, etc. All variables are the same as in the main results table in the paper.

[13] It may seem surprising that when dropping US we lose relatively few observations, despite it being by far the largest arms exporter. This is because I am restricting exporter pairs to have the same NATO and EU status, therefore United States can only be paired with other NATO members who are not in the EU.

Table 6: Sensitivity to dropping the 6 largest exporters, top 30 sample

		Excluding exporter (one at a time):					
	baseline	USA	Germany	Canada	UK	France	Belgium
ln(ME/GDP)	.43	.36	.54	.54	.48	.48	.45
	(.11)***	(.12)***	(.11)***	(.12)***	(.12)***	(.12)***	(.12)***
distance	-.16	-.13	-.21	-.19	-.19	-.13	-.16
	(.06)***	(.06)**	(.06)***	(.07)***	(.07)***	(.07)*	(.07)**
colonial relationship	-.53	-.52	-.44	-.55	-.54	-.49	-.53
	(.13)***	(.15)***	(.13)***	(.14)***	(.14)***	(.13)***	(.14)***
common language	-.02	-.03	.07	-.12	.02	.03	-.03
	(.12)	(.13)	(.12)	(.13)	(.12)	(.12)	(.13)
common border	.30	.30	.04	.31	.20	.39	.34
	(.11)***	(.11)***	(.10)	(.11)***	(.12)*	(.12)***	(.11)***
religious similarity	.96	.99	1.01	1.03	.93	.92	.90
	(.15)***	(.17)***	(.15)***	(.16)***	(.17)***	(.16)***	(.17)***
Polity similarity	-.75	-.61	-.68	-.69	-.86	-.62	-.93
	(.29)***	(.30)**	(.30)**	(.29)**	(.30)***	(.31)**	(.31)***
UNGA affinity	-2.16	-.84	-2.43	-2.37	-2.17	-2.18	-2.10
	(.22)***	(.39)**	(.21)***	(.25)***	(.23)***	(.23)***	(.23)***
capital/worker	.73	.57	1.11	.82	.69	.78	.69
	(.14)***	(.15)***	(.15)***	(.16)***	(.15)***	(.15)***	(.15)***
land/worker	.56	.59	.59	.50	.55	.57	.58
	(.04)***	(.04)***	(.04)***	(.04)***	(.04)***	(.04)***	(.04)***
years schooling	-1.75	-2.07	-2.73	-1.90	-1.78	-1.85	-1.75
	(.36)***	(.39)***	(.37)***	(.38)***	(.36)***	(.37)***	(.36)***
Polity score	.18	.14	.16	.17	.20	.15	.22
	(.05)***	(.05)***	(.05)***	(.05)***	(.05)***	(.06)***	(.05)***
NATO member	-.25	-.34	-.36	-.41	-.25	-.24	-.29
	(.12)**	(.13)***	(.11)***	(.14)***	(.12)**	(.12)*	(.12)**
EU member	.41	.48	.21	.47	.48	.53	.40
	(.13)***	(.13)***	(.12)*	(.13)***	(.13)***	(.13)***	(.13)***
Obs.	35016	31029	32071	32058	31941	32004	33075
e(N-clust)	424	395	396	395	395	395	396
R^2	.18	.16	.2	.18	.18	.19	.18

Notes: Column 1 shows baseline OLS results for the top 30 sample of exporters. Column 2 drops observations where the US is one of the exporters. Column 3 drops observations where Germany is an exporter, etc. All variables are the same as in the main results table in the paper.

Table 7: Sensitivity to dropping the 6 largest exporters, OECD sample

		Excluding exporter (one at a time):					
	baseline	USA	Germany	Canada	UK	France	Belgium
ln(ME/GDP)	1.04 (.21)***	.93 (.24)***	1.02 (.20)***	1.52 (.23)***	1.06 (.22)***	1.09 (.21)***	1.14 (.23)***
distance	-.28 (.08)***	-.24 (.08)***	-.35 (.07)***	-.28 (.08)***	-.26 (.09)***	-.32 (.08)***	-.26 (.08)***
colonial relationship	-.46 (.23)**	-.005 (.26)	-.40 (.24)*	-.53 (.25)**	-.48 (.24)**	-.27 (.22)	-.47 (.24)**
common language	.03 (.16)	-.15 (.18)	.11 (.18)	-.04 (.18)	.05 (.18)	.03 (.17)	.03 (.18)
common border	.15 (.13)	.16 (.14)	-.06 (.14)	.18 (.14)	.17 (.15)	.19 (.15)	.24 (.14)*
religious similarity	.69 (.18)***	.68 (.19)***	.59 (.19)***	.84 (.18)***	.73 (.20)***	.54 (.19)***	.61 (.20)***
Polity similarity	-5.98 (3.60)*	-5.60 (3.53)	-2.95 (3.59)	-6.48 (3.56)*	-5.83 (3.87)	6.16 (3.25)*	-11.13 (4.09)***
UNGA affinity	-.62 (.34)*	1.94 (.52)***	-1.21 (.32)***	-.53 (.37)	-.60 (.37)*	-.55 (.35)	-.50 (.36)
capital/worker	1.81 (.25)***	1.54 (.28)***	1.84 (.26)***	2.20 (.28)***	1.79 (.29)***	1.99 (.27)***	1.74 (.26)***
land/worker	.59 (.06)***	.63 (.06)***	.66 (.05)***	.46 (.07)***	.59 (.06)***	.65 (.06)***	.59 (.06)***
years schooling	.72 (.57)	.22 (.64)	-1.25 (.64)**	1.09 (.59)*	.84 (.60)	.53 (.59)	.58 (.60)
Polity score	.21 (.15)	.08 (.16)	.04 (.15)	.36 (.16)**	.21 (.16)	-.27 (.15)*	.44 (.19)**
NATO member	-.25 (.14)*	-.29 (.15)**	-.30 (.14)**	-.65 (.16)***	-.24 (.15)	-.27 (.14)*	-.30 (.15)**
EU member	.38 (.18)**	.34 (.18)*	.008 (.18)	.56 (.18)***	.41 (.19)**	.52 (.18)***	.35 (.18)*
Obs.	21780	18670	19510	19270	19462	19472	20308
e(N-clust)	221	200	202	200	201	201	201
R^2	.21	.19	.23	.22	.21	.23	.21

Notes: Column 1 shows baseline OLS results for the high income OECD sample of exporters. Column 2 drops observations where the US is one of the exporters. Column 3 drops observations where Germany is an exporter, etc. All variables are the same as in the main results table in the paper.

D.3 Robustness to market potential and market size

Table 8 tests the introduction of the market potential variable (which measures the concentration of foreign demand in a country's vicinity), and of own market size (GDP). Market potential is constructed as described in the paper: for any given country i, we sum the GDP of other countries, weighted by the inverse of the distance to country i.

Table 8: OLS estimation results, with market potential and GDP

	Top 60			Top 30			OECD		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ln(ME/GDP)	.84	.77	.81	.35	.34	.32	1.10	.93	1.06
	(.10)***	(.10)***	(.10)***	(.12)***	(.12)***	(.12)***	(.21)***	(.20)***	(.21)***
Market potential	.45		.54	-.05		-.16	.50		.44
	(.16)***		(.17)***	(.20)		(.21)	(.23)**		(.24)*
ln(GDP)		-.04	-.10		.24	.25		.16	.09
		(.06)	(.06)*		(.09)**	(.09)***		(.11)	(.11)
distance	-.16	-.30	-.12	-.23	-.25	-.30	-.16	-.34	-.19
	(.07)**	(.05)***	(.07)*	(.07)***	(.06)***	(.07)***	(.09)*	(.07)***	(.09)**
colonial relationship	-.20	-.18	-.17	-.57	-.64	-.65	-.45	-.50	-.49
	(.11)*	(.11)	(.11)	(.13)***	(.14)***	(.14)***	(.23)**	(.23)**	(.23)**
common language	.07	.08	.04	-.07	-.03	-.02	-.09	-.03	-.07
	(.11)	(.11)	(.10)	(.12)	(.12)	(.12)	(.17)	(.16)	(.17)
common border	.37	.30	.42	.30	.26	.23	.30	.15	.27
	(.10)***	(.09)***	(.10)***	(.11)***	(.11)**	(.11)**	(.14)**	(.13)	(.13)**
religious similarity	1.14	1.05	1.15	.95	.92	.89	.70	.58	.68
	(.14)***	(.14)***	(.14)***	(.16)***	(.16)***	(.16)***	(.18)***	(.18)***	(.18)***
Polity similarity	-.30	-.36	-.36	-.90	-.81	-.82	-7.09	-6.36	-7.28
	(.22)	(.23)	(.23)	(.29)***	(.29)***	(.29)***	(3.59)**	(3.60)*	(3.60)**
UNGA affinity	-1.75	-1.77	-1.87	-2.03	-1.67	-1.65	-.34	-.31	-.24
	(.20)***	(.20)***	(.20)***	(.22)***	(.26)***	(.26)***	(.35)	(.36)	(.37)
capital/worker	-.06	.01	-.04	.75	.66	.68	1.71	1.61	1.65
	(.09)	(.08)	(.09)	(.14)***	(.14)***	(.14)***	(.27)***	(.28)***	(.28)***
land/worker	.54	.48	.54	.54	.60	.58	.65	.62	.66
	(.04)***	(.03)***	(.04)***	(.05)***	(.04)***	(.05)***	(.06)***	(.06)***	(.07)***
years schooling	-.52	-.32	-.54	-1.81	-1.96	-1.88	.13	.17	.07
	(.27)*	(.26)	(.27)**	(.40)***	(.37)***	(.39)***	(.56)	(.55)	(.56)
Polity score	.08	.09	.09	.20	.18	.19	.26	.17	.24
	(.04)**	(.04)**	(.04)**	(.05)***	(.05)***	(.05)***	(.15)*	(.16)	(.15)
Obs.		62,914			35,016			21,780	
e(N-clust)		1,423			424			221	
R^2	.15	.14	.15	.18	.18	.18	.21	.21	.21

Notes: The "market potential" variable is the log difference between the market potential indicators for the two exporters. Similarly, "ln(GDP)" is the log difference between the GDP of the two exporters. All other variables and specifications are as in the main results table in the paper.

D.4 Product sub-samples

Having found evidence of the home market effect for military goods, a further way to test the model is to separate the arms and ammunition category along relevant dimensions. Trade data aggregation limits how much we can do,[14] but an informative first pass is to isolate two broad sub-categories: goods that are particularly well differentiated, and goods that are less well differentiated.

The goods I select in the high differentiation category include armoured vehicles, military rifles, bombs, grenades, torpedoes, mines, missiles, and similar munitions of war. For the less differentiated set of goods, I select cartridges.[15] In line with the theoretical model developed, I expect the coefficient on $ln(ME/GDP)$ to be higher for more differentiated military goods.

Table 9 summarizes results from a pooled OLS regression which included the higher and lower differentiation military goods (both compared against the same civilian control goods). All variables from table 3 in the main text were included and were also interacted with the high differentiation indicator. Results indicate that, indeed, the difference in the strength of the home market effect for the two groups is positive and statistically significant at the 1% level for the top 60 and top 30 samples, although imprecisely estimated in the high income OECD sample.

The effect of military spending on exports of highly differentiated military goods can be obtained by summing the two rows in table 9 (or, of course, running the regression with just this sub-sample). Coefficients are: 1.20 (top 60 sample), 0.79 (top 30), and 1.35 (OECD). So the relative ordering remains the same: the home market effect is stronger for rich countries and weaker for large countries.

Results are consistent with the model and conclusions so far: in all three samples, increased

[14] See appendix section C.2 for a list

[15] To be clear, I am not claiming that ammunition is not differentiated across types and calibers, merely that cartridges of a given caliber - but manufactured by different companies - are easy substitutes.

Table 9: High and lower differentiation military goods, pooled OLS regression

	Top 60	Top 30	OECD
	(1)	(2)	(3)
ln(ME/GDP)	.35	.15	.98
	(.12)***	(.15)	(.22)***
ln(ME/GDP)*High differentiation	.85	.64	.37
	(.14)***	(.19)***	(.26)
Obs.	38,503	27,061	19,673
e(N-clust)	1,145	411	219
R^2	.19	.22	.23

Notes: dep. variable = $\ln\left(\frac{S_{mjk}/S_{mhk}}{S_{ojk}/S_{ohk}}\right)$: flow of military goods (m) from exporters j and h to importer k, vs. flows of control goods (o). Although not reported, all additional variables from Table 3 in the main text, as well as their interaction with the "high differentiation" dummy variable, are included in the regressions.

military spending has a stronger effect on exports of highly differentiated weapons than on cartridges (although the interaction term is statistically insignificant for the OECD sample). Furthermore, the result from the top 30 sample suggests that cartridges do not exhibit home market effects at all - i.e. an increase in the military budget would have no effect on cartridge exports.

D.5 Equipment-specific military spending

So far I have used overall military spending to measure demand for weapons. However, this measure also incorporates spending on personnel wages, pensions, training, infrastructure construction and maintenance, etc. An immediate concern is that expenditure on weapons and ammunition may have greater than 1 elasticity with respect to overall military spending, since personnel spending is less elastic: when military budgets are cut, for instance, it is easier to curtail acquisition programs than to make personnel cuts or stop paying veterans benefits. This implies that previous estimates of the home market effect may be biased upwards (although still retain the correct sign).

To get around this problem, I would ideally like to use the specific spending amounts on weapons and ammunition, instead of overall military spending.

NATO publishes online disaggregated data on military spending for member countries. The equipment outlay amount is reported separately from personnel, infrastructure, and other expenditures. The average share of equipment spending out of total military expenditure in the sample is 16%. Using these data instead of overall military expenditure reduces the sample size by between 63% (OECD sample) and 80% (top 60 sample).[16]

Table 10: Pooled OLS regression, using equipment spending to indicate demand

	Top60	Top30	OECD
	(1)	(2)	(3)
ln(MEeqp/GDP)	-.31	-.45	-.52
	(.12)**	(.14)***	(.14)***
ln(MEeqp/GDP)*High differentiation	.76	.97	.95
	(.15)***	(.17)***	(.17)***
Obs.	11,980	8,940	8,532
e(N-clust)	180	88	75
R^2	.21	.23	.22

Notes: dep. variable = $\ln\left(\frac{S_{mjk}/S_{mhk}}{S_{ojk}/S_{ohk}}\right)$: flow of military goods (m) from exporters j and h to importer k, vs. flows of control goods (o). Although not reported, all additional variables from Table 3 in the main text, as well as their interaction with the "high differentiation" dummy variable, are included in the regressions.

I repeat the pooled OLS estimation from table 9, but for the restricted expenditure measure. Results are reported in table 10. Interestingly, not only is the interaction coefficient sizeable and significant, but the coefficient on cartridges is *negative.* In other words, cartridges display the reverse of the home market effect: higher equipment spending will be accompanied by higher exports of complex weapons, but *lower* exports of ammunition. A sufficient condition to explain this result

[16]The only other disaggregated data source available is capital expenditures from Gartzke (2001). However, this variable is only available for some countries and only until 1997 - in the top 60 sample, only 8 percent of observations would be usable. Where the capital and equipment spending data overlap, the correlation is extremely high for some countries (.83 for Italy, .90 for Canada, .99 for the US), but lower for others (.21 for Spain, .16 for UK, .09 for Norway), so we cannot reliably impute one series' missing values from the other.

is that cartridges are less differentiated and at least as cheap to transport as the control goods.[17], which seems fairly reasonable.

How different is the effect on highly differentiated military goods when considering overall vs. equipment spending? We compare the sum of the two rows in table 9 with the sum of the two rows in table 10. For all three samples, the effect is larger when we measure demand with overall military spending, and the difference is sizeable in the top 60 (1.20 vs .45) and the OECD (1.35 vs .43) samples. At least in part, this must be due to the greater than 1 elasticity of equipment vs overall military spending.

At the finer spending level, however, the argument that military expenditure is exogenous becomes weaker: even if trade shocks cannot influence the total military budget, they may affect how much of that budget is allocated to armament purchases. For example, large manufacturers who encounter poor demand abroad may pressure the domestic government to purchase their product, in order to keep them in business and maintain strategic independence. The bias introduced through this mechanism is negative, so it may help explain the gap in estimates mentioned in the previous chapter. Fortunately, instrumenting with lagged military spending (either overall or capital/equipment-specific) promises to address this negative bias. Contemporaneous overall spending may be a suitable instrument as well, since lobbying efforts are unlikely to have an immediate effect on the total military budget.

Table 11 summarizes results from OLS and IV estimation results when the measure of demand is military equipment spending, and the set of military goods is restricted to highly differentiated weapons. As expected from the discussion above, IV estimates are uniformly higher than OLS ones (although the difference is not significant in all cases). I prefer these IV estimates as less biased,

[17]The model predictions are less straightforward if cartridges are less differentiated but more expensive to transport than control goods, or the other way around.

with the caveat that they refer to a subset of military goods (what I deemed the more highly differentiated group), and they are obtained in a sample of exporters that are all NATO members, therefore external validity is not guaranteed. In terms of magnitude of the effect, the IV estimates from table 11 suggest that a 10% increase in spending on military equipment will lead to a 5.7 to 10.6% increase in exports of differentiated military weapons.

Table 11: Combined OLS and IV estimation results, military equipment data, high differentiation goods

	Top 60	Top 30	OECD
	(1)	(2)	(3)
OLS$^{(a)}$	.45	.53	.43
	(.11)***	(.12)***	(.12)***
IV$^{(b)}$			
ln(mil eqpmt/GDP), lag 5	.71	.66	.57
	(.19)***	(.20)***	(.20)***
ln(mil eqpmt/GDP), lag 10	.72	.86	.80
	(.21)***	(.21)***	(.22)***
ln(ME/GDP), concurrent	.91	.89	1.06
	(.16)***	(.18)***	(.19)***
ln(ME/GDP), lag 5	.98	.92	.92
	(.24)***	(.22)***	(.22)***
ln(ME/GDP), lag 10	.80	.66	.81
	(.22)***	(.23)***	(.25)***

Notes: dep. variable = $\ln\left(\frac{S_{mjk}/S_{mhk}}{S_{ojk}/S_{ohk}}\right)$: flow of military goods (m) from exporters j and h to importer k, vs. flows of control goods (o).
$^{(a)}$,$^{(b)}$ OLS and IV coefficients reported are from $3\times6 = 18$ individual regressions, using military *equipment* expenditure.
Other coefficients are omitted for brevity. Standard errors are clustered by exporter pair, and the level of significance indicated is at 10%(*), 5%(**), and 1%(***).

D.6 Robustness to conflicts

I verify that the paper's main results are not driven by conflict-related strategic trade.

Table 12 introduces a control variable for the difference between the conflict status of the two exporters, so it can take three values: 1 if exporter 1 is in an international conflict and exporter 2 is not, 0 if either both or none of the exporters are at war, and -1 if only the second exporter is involved in conflict. The new variable is significantly negative in the first 2 samples, which would suggest that countries involved in conflict are exporting fewer weapons. However, keep in mind that conflict involvement increases military spending, and the point estimates on $\ln(ME/GDP)$ are (insignificantly) higher. So it is actually possible for conflict to *increase* exports by bolstering domestic demand for weapons and encouraging the local arms industry.

In any case, determining the impact of conflict on arms exports is beyond the scope of this paper. This exercise is simply meant to ensure that the coefficient on $\ln(ME/GDP)$ is not significantly affected in this alternate specification - which it is not.

Table 13 performs a further test. In columns 1, 3, and 5 I drop observations in which either of the exporters is involved in a severe conflict,[18] whereas in columns 2, 4, and 6 I proceed to drop minor conflicts as well.

One final test, shown in table 14 considers only cases where exporter 1 is involved in a conflict, but exporter 2 is not. [[ ]]

[18]Recall that *severe* refers to more than 1,000 battle deaths during a given year, coded as "intensity=2" by the PRIO database

Table 12: Controlling for conflicts

	Top 60	Top 30	OECD
	(1)	(2)	(3)
ln(ME/GDP)	.92	.58	1.04
	(.09)***	(.12)***	(.21)***
conflict	-.32	-.82	.06
	(.12)***	(.14)***	(.13)
distance	-.37	-.24	-.27
	(.05)***	(.06)***	(.08)***
colonial relationship	-.10	-.49	-.46
	(.11)	(.13)***	(.22)**
common language	.03	-.03	.03
	(.11)	(.12)	(.16)
common border	.27	.27	.15
	(.09)***	(.11)**	(.13)
religious similarity	1.06	.76	.69
	(.14)***	(.15)***	(.18)***
Polity similarity	-.32	-.40	-5.92
	(.22)	(.27)	(3.61)
UNGA affinity	-1.83	-2.58	-.58
	(.21)***	(.22)***	(.33)*
capital/worker	-.02	.74	1.81
	(.08)	(.14)***	(.25)***
land/worker	.48	.57	.59
	(.03)***	(.04)***	(.06)***
years schooling	-.40	-2.08	.72
	(.25)	(.36)***	(.57)
Polity score	.10	.14	.21
	(.04)**	(.05)***	(.15)
NATO member	-.37	-.20	-.25
	(.10)***	(.12)*	(.14)*
EU member	.02	.29	.38
	(.11)	(.12)**	(.18)**
Obs.	62914	35016	21780
e(N-clust)	1423	424	221
R^2	.15	.19	.21

Notes: Variable *conflict* is the simple difference between a conflict indicator for exporter 1 and the conflict indicator for exporter 2. All other variables are the same as in the baseline OLS results table in the paper.

Table 13: Excluding conflicts - severe and all

	Top 60		Top 30		OECD	
	(1)	(2)	(3)	(4)	(5)	(6)
ln(ME/GDP)	.83	.85	.41	.64	1.06	1.12
	(.09)***	(.10)***	(.12)***	(.14)***	(.21)***	(.23)***
distance	-.35	-.49	-.17	-.31	-.26	-.26
	(.05)***	(.05)***	(.06)***	(.07)***	(.08)***	(.08)***
colonial relationship	-.07	-.04	-.53	-.41	-.45	-.26
	(.11)	(.15)	(.14)***	(.16)**	(.23)**	(.24)
common language	.02	-.23	-.02	-.20	.03	-.03
	(.11)	(.12)*	(.12)	(.13)	(.16)	(.18)
common border	.25	.26	.28	.30	.17	.16
	(.09)***	(.10)***	(.11)**	(.12)**	(.13)	(.14)
religious similarity	1.13	.62	.92	.42	.69	.76
	(.14)***	(.15)***	(.16)***	(.17)**	(.18)***	(.19)***
Polity similarity	-.33	.72	-.44	1.32	-6.09	-6.98
	(.21)	(.23)***	(.30)	(.36)***	(3.61)*	(3.68)*
UNGA affinity	-1.46	-1.14	-2.03	-1.54	-.46	-.21
	(.19)***	(.26)***	(.22)***	(.30)***	(.35)	(.39)
capital/worker	.01	.17	.78	.86	1.79	1.80
	(.08)	(.10)*	(.15)***	(.17)***	(.25)***	(.26)***
land/worker	.50	.60	.58	.67	.59	.59
	(.03)***	(.03)***	(.04)***	(.04)***	(.06)***	(.06)***
years schooling	-.06	-.17	-1.65	-2.28	.68	.73
	(.25)	(.30)	(.37)***	(.46)***	(.57)	(.59)
Polity score	.07	-.09	.11	-.19	.21	.24
	(.04)**	(.04)**	(.05)**	(.07)***	(.15)	(.16)
NATO member	-.37	-.33	-.24	-.12	-.25	-.26
	(.10)***	(.11)***	(.12)**	(.14)	(.14)*	(.15)*
EU member	.05	-.23	.41	.13	.38	.37
	(.11)	(.12)**	(.13)***	(.15)	(.18)**	(.18)**
Obs.	58541	42779	32692	25983	21338	19498
e(N-clust)	1417	1109	422	359	221	220
R^2	.15	.17	.18	.2	.21	.2

Notes: Relative to the baseline OLS results from the body of the paper, these regressions drop observations where at least one of the two exporters was involved in a *severe* conflict (1,3,5), or when at least one exporter was involved in *any* conflict (2,4,6). All variables are the same as in the main results table in the paper.

Table 14: Special sub-sample test: trade from country at war vs. trade from country at peace

	Top 60	Top 30	OECD
	(1)	(2)	(3)
ln(ME/GDP)	.65	.52	.65
	(.22)***	(.30)*	(.57)
distance	-.33	-.14	-.39
	(.09)***	(.13)	(.17)**
colonial relationship	-.24	-.49	-.79
	(.20)	(.22)**	(.43)*
common language	.26	.14	-.10
	(.20)	(.21)	(.39)
common border	-.02	.06	-.04
	(.24)	(.29)	(.38)
religious similarity	.92	.71	.52
	(.36)**	(.37)*	(.56)
Polity similarity	-1.65	-1.81	14.06
	(.39)***	(.46)***	(18.42)
UNGA affinity	-2.63	-2.90	-2.09
	(.32)***	(.41)***	(.68)***
capital/worker	.09	1.02	2.14
	(.20)	(.30)***	(.75)***
land/worker	.40	.44	.53
	(.07)***	(.09)***	(.14)***
years schooling	-.36	-2.28	1.27
	(.54)	(.74)***	(1.66)
Polity score	.33	.37	-.08
	(.06)***	(.08)***	(.49)
NATO member	-.36	-.55	-.34
	(.20)*	(.19)***	(.28)
EU member	-.32	.15	.33
	(.19)*	(.20)	(.41)
Obs.	9448	5730	2177
e(N-clust)	411	149	62
R^2	.18	.24	.28

Notes: Relative to the baseline OLS results from the body of the paper, these regressions keep only the sub-sample of observations where exporter 1 is at war (minor or severe), but exporter 2 is not. All variables are the same as in the main results table in the paper.

D.7 Estimation over different time intervals

I investigate the robustness of the estimation results over time. Table 15 reports the main coefficient of interest (on military spending out of GDP) from 15 OLS regressions. Column 1 reports the baseline OLS results estimated over the full 23 years of the sample. Column 2 restricts the sample to the first six years (1990-1995); column 3 considers the next six years (1996-2001); column 4 includes the subsequent six years (2002-2007); column 5 includes the final five years of the sample (2008-2012).

Estimates are quite robust for the largest (top 60) sample of exporters. For the top 30 and OECD sub-samples of exporters, point estimates of the main coefficient vary more, but of course standard errors are quite large as well, as we face a severely restricted sample. The coefficient is indistinguishable from zero in only one instance.

The intent of this exercise was to ensure that results are not driven by an anomalous year or group of years. This does not appear to be the case. An interesting question for the future is why the home market effect appears to be weaker in the 2002-2007 time period than in the preceding six years. However, this inquiry is beyond the scope of the current paper.

Table 15: Time period sensitivity of baseline OLS results

	1990-2012 (baseline)	1990-1995	1996-2001	2002-2007	2008-2012
	(1)	(2)	(3)	(4)	(5)
Top 60	.85	.78	1.04	.73	.81
	(.09)***	(.09)***	(.12)***	(.12)***	(.12)***
Top 30	.43	.33	.50	.29	.59
	(.11)***	(.13)**	(.15)***	(.15)*	(.15)***
OECD	1.04	1.86	2.14	.32	.81
	(.21)***	(.24)***	(.33)***	(.24)	(.24)***

Notes: Summary of results from robustness estimations over different time periods within the sample. Column 1 reports the baseline OLS results estimated over the full 23 years of the sample. Subsequent columns consider 6 and 5-year time intervals. Although only the main coefficient is reported, all other controls were included - they are just suppressed for brevity.

D.8 Additional estimation results

Table 16: IV first stage

	Top 60		Top 30		OECD	
	(1)	(2)	(3)	(4)	(5)	(6)
ln(ME/GDP), lag 5	.87 (.006)***		.92 (.008)***		.91 (.01)***	
ln(ME/GDP), lag 10		.81 (.01)***		.85 (.01)***		.89 (.02)***
distance	.003 (.005)	.03 (.007)***	.02 (.005)***	.07 (.008)***	.04 (.005)***	.08 (.008)***
colonial relationship	.05 (.007)***	.11 (.01)***	.05 (.007)***	.09 (.01)***	.02 (.006)***	.05 (.01)***
common language	-.06 (.007)***	-.12 (.01)***	-.04 (.006)***	-.08 (.01)***	-.03 (.006)***	-.06 (.009)***
common border	.006 (.005)	.02 (.008)*	.008 (.005)*	.01 (.009)*	.01 (.005)***	.03 (.009)***
religious similarity	-.05 (.008)***	-.09 (.01)***	-.04 (.008)***	-.07 (.01)***	-.03 (.007)***	-.05 (.01)***
Polity similarity	.0008 (.02)	.007 (.03)	.06 (.02)***	.03 (.04)	.84 (.23)***	1.24 (.45)***
UNGA affinity	-.20 (.01)***	-.33 (.02)***	-.22 (.02)***	-.35 (.02)***	-.23 (.02)***	-.32 (.03)***
capital/worker	.06 (.005)***	.09 (.01)***	.08 (.008)***	.12 (.01)***	.07 (.01)***	.20 (.02)***
land/worker	-.002 (.002)	-.006 (.003)*	-.004 (.002)*	-.01 (.004)***	-.002 (.002)	-.004 (.003)
years schooling	-.07 (.01)***	-.10 (.03)***	-.09 (.02)***	-.18 (.04)***	-.18 (.03)***	-.36 (.04)***
Polity score	-.002 (.003)	-.007 (.005)	-.02 (.004)***	-.01 (.007)*	-.04 (.007)***	-.03 (.01)**
NATO member	.03 (.006)***	.05 (.01)***	.01 (.007)*	.04 (.01)***	.03 (.007)***	.06 (.01)***
EU member	-.01 (.01)	.05 (.02)***	.05 (.01)***	.10 (.02)***	.05 (.01)***	.08 (.02)***
Obs.	31206	20756	19885	14068	13678	10147
e(N-clust)	1084	905	376	363	211	210
R^2	.92	.87	.92	.87	.93	.88

Notes: First stage estimation results, using 5- and 10-year lags to instrument for current military spending. All other variables are as described in the body of the paper.

Table 17: Combined IV estimation *first stage* results, military equipment data

	Top 60	Top 30	OECD
	(1)	(2)	(3)
ln(mil eqpmt/GDP), lag 5	.74	.85	.80
	(.03)***	(.03)***	(.03)***
ln(mil eqpmt/GDP), lag 10	.76	.91	.79
	(.03)***	(.04)***	(.04)***
ln(ME/GDP), concurrent	1.52	1.58	1.56
	(.08)***	(.09)***	(.10)***
ln(ME/GDP), lag 5	1.40	1.60	1.57
	(.09)***	(.10)***	(.11)***
ln(ME/GDP), lag 10	1.52	1.61	1.62
	(.11)***	(.12)***	(.13)***

Notes: First stage estimation results using lagged military equipment spending, current overall military spending, and lagged overall military spending to instrument for current military equipment spending. Instruments are considered separately. Results shown are from 5x3=15 individual first stage regressions - the other coefficients are omitted for brevity. Standard errors are clustered by exporter pair. Significance indicated is at 10%(*), 5%(**), and 1%(***).

Table 18: Full IV estimation results for overall military spending

	Top 60		Top 30		OECD	
IV =	lag 5	lag 10	lag 5	lag 10	lag 5	lag 10
	(1)	(2)	(3)	(4)	(5)	(6)
ln(ME/GDP)	.94	.64	.60	.34	.86	.51
	(.12)***	(.14)***	(.14)***	(.15)**	(.22)***	(.23)**
exporter-importer distance measures						
geographical distance	-.38	-.37	-.18	-.22	-.27	-.23
	(.06)***	(.06)***	(.07)***	(.07)***	(.08)***	(.08)***
colonial relationship	-.29	-.25	-.81	-.92	-.52	-.26
	(.16)*	(.17)	(.15)***	(.17)***	(.24)**	(.25)
common language	.26	.21	.23	.10	.19	-.09
	(.14)*	(.15)	(.13)*	(.15)	(.18)	(.19)
common border	-.03	-.03	.03	.06	-.06	-.001
	(.11)	(.13)	(.12)	(.14)	(.15)	(.16)
religious similarity	1.11	.97	1.35	1.20	.86	.98
	(.17)***	(.18)***	(.16)***	(.18)***	(.19)***	(.20)***
Polity similarity	.16	.71	-.77	-.81	-.84	36.31
	(.28)	(.30)**	(.33)**	(.34)**	(4.87)	(7.87)***
UNGA affinity	-1.76	-2.01	-2.19	-2.38	-.95	-1.10
	(.22)***	(.25)***	(.24)***	(.26)***	(.37)***	(.38)***
exporter endowment and institutions						
capital/worker	.04	.12	.64	.68	1.71	1.59
	(.10)	(.10)	(.15)***	(.16)***	(.25)***	(.26)***
land/worker	.48	.52	.56	.60	.57	.54
	(.04)***	(.04)***	(.04)***	(.04)***	(.06)***	(.06)***
years schooling	-.25	-.55	-1.66	-1.93	1.52	1.61
	(.30)	(.32)*	(.37)***	(.39)***	(.62)**	(.65)**
Polity score	.001	-.09	.19	.19	.07	-.41
	(.05)	(.05)*	(.06)***	(.06)***	(.17)	(.18)**
NATO member	-.51	-.70	-.48	-.66	-.43	-.57
	(.11)***	(.12)***	(.12)***	(.12)***	(.14)***	(.14)***
EU member	.31	.53	.65	.66	.71	.74
	(.12)**	(.13)***	(.14)***	(.14)***	(.20)***	(.20)***
Obs.	31,206	20,756	19,885	14,068	13,678	10,147
e(N-clust)	1084	905	376	363	211	210
R^2	.16	.16	.22	.22	.23	.22

Notes: dep. variable = $\ln\left(\frac{S_{mjk}/S_{mhk}}{S_{ojk}/S_{ohk}}\right)$: flow of military goods (m) from exporters j and h to importer k, vs. flows of control goods (o). Importer and year fixed effects are included in all regressions. Standard errors are clustered by exporter pair, and the level of significance indicated is at 10%(*), 5%(**), and 1%(***).

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