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The Location of U.S. States' Overseas Office

By

Andrew J. Cassey

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The Location of U.S. States' Overseas Offices

Andrew J. Cassey*
School of Economic Sciences
Washington State University

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Abstract

Forty U.S. states operated an overseas office in 2002. Treating overseas offices as sales offices, I modify Holmes (2005) so offices facilitate exports by reducing the transaction cost of selling abroad. From theory, states operate an office if aggregate savings outweigh operating costs. Exploiting the differences in where states locate offices in the data, and controlling for aggregate characteristics, I estimate the impact of exports on the probability of an office existing. In addition, I find the average state savings from an office is 0.005%–0.009% of exports with a cut-off threshold of $1.0–1.4 billion.

JEL classification: F13, H76, L60, 024, R10

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Correspondence: 101 Hulbert Hall, Pullman, WA 99164; cassey@wsu.edu
Department fax: 509 335 1173

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1 Introduction

U.S. state governments actively engage in state economic development, in part through policies intended to enhance exports and attract foreign direct investment. Among the export promotion policies used by some states are trade offices located within foreign countries. These overseas offices employ state representatives charged with a variety of promotional tasks including organizing meetings between private firms from that state and potential foreign customers, guiding state firms through foreign legal and marketing institutions, and promoting state products and industries.

There is a large literature on private investment in export promotion, on both theoretical (see Arkolakis 2006; Melitz 2003, for example) and empirical results (Andersson 2007; Rauch 1999; Roberts and Tybout 1997). The literature on public investment in export promotion is markedly smaller. Yet, there is a plausible role for a government interested in promoting exports to decrease the aggregate transaction cost of the state's exports by acting as a coordinator and a middle man in making contacts and spreading information. Rather than having each exporting firm pay to find its own export partners, the government provides these contacts to all at a cost less than the sum of individuals. Overseas offices are one possible technology for achieving this.

I estimate the transaction cost savings induced by overseas offices. When states use overseas offices, they must decide in which country to locate the office. By using the differences in overseas office locations chosen by U.S. states, I estimate the impact of exports on the probability of locating an office in that country. From this, I estimate the implied benefit of having an overseas office to be in the range of \$90,000–\$130,000 per billion in exports, or 0.009–0.013%. Finally, I estimate a theoretically predicted necessary and sufficient benefit of overseas offices, in dollars, that the average state-country pair must reach in order for an office to exist. It is between \$1–\$1.4 billion.

Overseas offices have been in use since New York opened an office in Europe in 1954 (Blase 2003, 93) though they did not become widespread until the 1980s and 1990s. However, the effectiveness of overseas offices, as well as other export promotion policies such as trade missions and trade fairs, is still debated. In a case study, Kehoe and Ruhl (2004) suggest Wisconsin's enhanced export activity to Mexico after NAFTA is due to the presence of a Wisconsin office located in Mexico City. California, on the other hand, closed all of their funded overseas offices amid the 2003 budget

crises in part because of exaggerated, even fraudulent, claims about the offices' success. In general, there is no consensus estimate for the effectiveness of overseas offices. Despite this, overseas offices are common. There are 228 overseas offices in 2002 with 40 states having at least one office. The number of state overseas offices varied from a low of 0 to a high of 17 for Pennsylvania. There are 31 countries in the world hosting at least one overseas office.

These facts are a sample of the information from an overseas office data set I create by combining Whatley's (2003) published report with personal interviews of state development directors and officials. This data set documents both the operating state and the country location for every overseas office of all 50 U.S. states in 2002. Advantageously, overseas office locations are easily observable, a feature not shared by some other state sponsored export programs. Furthermore, because I know, for each state, which countries have an office and which do not, I know which countries state governments are targeting with their overseas office policy. For exports, I use the unique OM export data set described and tested in Cassey (2006). The OM data are state manufacturing exports to each country in the world for the years 1999–2005.

I create a model of the decision facing state governments on whether to locate an overseas office in a particular country. The model, based on Holmes (2005), assumes state governments are profit maximizing in the sense of wanting to minimize the aggregate cost of a given level of exports. Model offices reduce the transaction cost of selling exports from the state to the countries in which they are located. There is, however, a fixed cost for operating an office. The fixed cost has both a state and country component capturing the idiosyncrasies of individual states and countries. In addition, each state has two randomly drawn costs for each country. One of these random costs reflects the quality of the match between state and country if there is no office for that pair. The other random cost reflects the quality of the match between state and country if there is an office.

The model treatment of overseas offices is similar to the theory of public investment in state exports espoused in Cassey (2008) in that exports are the cause of the policy not vice versa. Cassey's findings support modeling exports as the independent variable, as well as providing evidence of an underlying state-country match term explicitly modeled here. A fundamental difference, however, is here the investment technology is modeled as reducing the transaction cost for a given level of state exports rather than a reduction of the fixed cost for individual firms to begin exporting. Another

key difference is the focus level. Cassey builds a model of the relationship between exports from individual firms and the government. Here, firms are not explicitly modeled. Rather the model treats aggregate exports as given regardless of the action of the government. A final difference is the data set. Here the investment technology is overseas offices whereas in Cassey it is governor-led trade missions. An advantage of overseas offices over trade missions is their relative permanence, an indication of the long-term relationship between state and country.

My focus on overseas offices locations differs from the previous literature on public investment and export promotion. Authors such as Wilkinson (1999), Wilkinson, Keillor and d'Amico (2005), and Bernard and Jensen (2004) study the impact of state expenditures on international programs on exports or employment. These papers look for an impact at the level of total state exports. A crucial difference with the present work is these papers do not have information on how state expenditures are targeted to specific countries. Therefore they cannot consider the targeted nature of public investment. Another example is McMillan (2006) who studies the impacts of overseas offices on foreign direct investment. Though he obtains office information from interviews, his FDI measure is not country specific. Thus he cannot establish a direct link between which countries have offices and which countries are providing FDI to the states under consideration. Nitsch (2005) and Ries and Head (2007) do consider that public investment may be targeted to specific countries. They use data on the countries receiving exports as well the countries hosting government-led trade missions. They compare exports to countries visited by a trade mission to exports for countries not visited to estimate the impact of the missions on exports. There is no consensus in the literature as to whether export promotion increases exports or not.

The common theme in the literature is the estimating of the average impact of export promotion on state exports by using government expenditures or a policy dummy variable as regressors. The conflicting results are due to three problems: volatility in the export data, measurement of the policy variable, and causality. The state export data is quite volatile from year to year within state-country pairs. Therefore any policy would need to have a big impact to be significantly different from randomness. Also, it is difficult to measure the quality of export promotion policies, how expenditures are spent in practice, or how long after the policy is enacted one should look for results. Finally, simultaneity between the policy variable and exports biases estimates. Some

papers attempt to control for causality through various econometric techniques, though none have an explicit theory describing causality as this paper does.

I use a cross-sectional approach to the data rather than a longitudinal approach. I use the locations of overseas offices, which is more reliably measured than expenditures, to estimate the implied savings achieved with offices. Using a data set involving many agents such U.S. states is essential because the low number of agents for Ries and Head using Canada alone, or Nitsch using France, Germany, and the United States, do not allow for enough variation for estimation in a cross-section.

Not only does this paper provide an empirical contribution, it also brings theoretical matching considerations into an international trade context. The matching considerations a firms uses when locating sales offices across cities within a country (Holmes 2005) appear quite similar to those of a multinational corporation choosing which countries to locate factories (Helpman, Melitz and Yeaple 2004). It seems reasonable the same kinds of matching considerations would extend to which countries a firm chooses to export (Eaton, Kortum and Kramarz 2005). Nonetheless the trade literature has not yet used unobserved matching to account for trade patterns. This paper is among the first to use matching in the context of international trade at the level of states and countries rather than at the individual firm level.

WHERE TO PUT THIS? A direct approach to determining if office matter to exports would be to estimate a gravity equation

$$\log X_{ij} = \alpha + \beta_i Y_i + \beta_j Y_j + \beta_1 D_{ij} + \gamma O_{ij} + \varepsilon_{ij} \tag{1}$$

where Y_i and $Y_j$are fixed effects for states and countries, respectively, D_{ij} are observable bilateral features such as distance or common language terms, etc., and O_{ij} is an office dummy. I do not need free trade agreement because this occurs at the national level. The fixed effects replace GDP variables and also unobserved multilateral resistance pricing variables as in Anderson and van Wincoop (2003).

The problem here is the possible endogeneity (can test for it using a lagged dependent variable) of the office dummy. Given in the data, most offices are in large exporting states, this enogeneity

biases estimates upwards, and thus can lead to false positives.

One solution to this problem are to find an instrument for O, but I cannot think of one. Another solution is to use panel data. I don't have the panel for all, or even most states. Also even with the panel, there is endogeneity issues unless the offices are opening and closing frequently, which is not seemingly true for overseas offices. Therefore I need a different approach entirely.

Talk a lot more about modelling information and how I go over top of this.

I like using offices because they are relatively long-term investment indicator. Trade missions are subject to measurement error because they are ephemeral. Multiple trips are common, so it is not clear if these should be counted seperately are lumped together as part of a broad investment strategy. Furthermore, what counts as a mission is somewhat arbitrarty. Does a governor have to be present, or does a Lt. Gov. count? What about a commerce chair?

One interpretation of the matching cost is random things that make the transaction costs differ among otherwise identical state-country pairs. One thing could be similar language (Spanish) of exporters (but not necessarily Gov since the draws are iid) or immigration patterns.

2 Defining an Overseas Office

An overseas office is a wholly or partially state government funded establishment physically located in a foreign country with a stated purpose of overseas public investment. Overseas offices differ from economic development offices located within the United States even if the domestic offices specialize in export promotion and foreign direct investment attraction. I count neither domestic offices housing foreign trade specialists as an overseas office nor privately funded trade associations with foreign offices. Overseas offices are not part of a U.S. embassy or have direct affiliation with any federal program.

Overseas offices range in the tasks they are instructed to perform. I count an office as an overseas office if any part of its mission is to promote exports or attract FDI. Other tasks overseas offices are asked to perform include tourism promotion, educational exchanges, and in the case of Hawaii, promote culture (Department of Business 2008).

Overseas offices do not have inventory, nor do the employees sell merchandise. Rather the

employees of the overseas office work as an intermediary to help state exporters begin selling their goods in the foreign country, as well as promote the state as a location for foreign direct investment. In practice an overseas office organizes trade shows and trade missions showcasing the state's wares, helps potential exporters manage the legal system of the country, provides market data and research to potential exporters, informs domestic firms of the activities of other trade associations, and arranges for interpreters.[1] It is common for overseas offices to have a focus on certain industries.[2] Some states, such as Wisconsin, charge a fee for providing services on behalf of domestic firms.

Not only do the tasks assigned to overseas offices very greatly, so do the arrangements. Some overseas offices are wholly funded by a single state, but it is quite common for several states to jointly fund a single overseas office. For example, the Council of Great Lake States administers overseas offices in Australia, Brazil, Canada, Chile, China, and South Africa. The councils member states—Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin—may opt in to any of these offices. Member states are not required to participate or pay for all of them.[3] In such cases, I count each overseas office separately. Thus if Ohio and Pennsylvania share the same overseas office in China, I count Ohio has having an overseas office in China and I count Pennsylvania has having an overseas office in China.

Some states refer to their overseas office location by region rather than host country. For example, Oklahoma lists a Middle East office. This office is physically located in Israel. Other examples include overseas office located in Europe, Southeast Asia, and Oceania. In such instances I use the country where the office is physically located. There is a single case of a state having two offices in the same country: Pennsylvania has an investment office and a seperate export office in the United Kingdom. I count this as a single overseas office.

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[1] *Sources:* Oklahoma Department of Commerce–International Trade Offices `http://www.okcommerce.gov/index.php?option=content&task=view&id=362&Itemid=440` (accessed May 4, 2008); Department of Business 2008; Minnesota-China Partnership, Trade Assistance `http://www.minnesota-china.com/assistance.htm` (accessed May 4, 2008); State of Washington Department of Community, Trade, and Economic Development, Exporting FAQs `http://www.cted.wa.gov/site/121/default.aspx` (accessed May 4, 2008).

[2] *Source:* Interview with Julian Munnich (Massachusetts Office of International Trade & Investment), conducted by the author, May 1, 2008.

[3] *Sources*: Interview with Tony Lorusso (Minnesota Trade Office) conducted by the author, April 23, 2008; The Council of Great Lake States `http://www.cglg.org/projects/trade/index.asp` (accessed April 27, 2008).

Overseas office employees are typically contracted representatives of the state and thus are neither state employees nor U.S. citizens. The number of staff is small, around two or three workers. In exceptional cases unpaid volunteers agree to act as a contact on behalf of the state. For example, in Minnesota, U.S. citizens living abroad would introduce Minnesota business owners to potential partners in the country they were based for non-related reasons. New Hampshire appoints consuls that are primarily state residents living abroad.[4] I do not include volunteers or consuls as overseas offices. Volunteers and consuls differ from overseas office employees because their primary job is not to represent the states interests. There primary job is typically private. They function primarily as an advisor or a contact, but do not engage in market research or other export promoting activities.

3 Facts About Overseas Office Locations

The data is the year 2002 cross-section of the location of overseas offices. The primary source of the office location data is the report of a survey of state development agencies (Whatley 2003). I supplement this data with personal interviews of state employees. Full details of the office data are available in appendix A. The office data is binary consisting of a 1 if state i has an office in country j in 2002 and a 0 otherwise. There is one exception to this: I use data for 2003 for Oklahoma as a record of overseas office locations for 2002 could not be established.

In addition I use the Origin of Movement panel data on state manufacturing exports from the World Institute for Strategic Economics Research (WISER various years) documented in Cassey (2006). The unique feature of this export data is the destination country of state exports is known. Only manufacturing values are reliable thus agriculture and mining exports are not included. I deflate the nominal export values reported by the OM data using the PPI with base year 1982. Next I average bilateral state to country real exports over the years 1999–2005 to use as exports. The units are in billions of real (1982) U.S. dollars.

Applying the definition of an overseas office from section 2 to the data set allows one to establish stylized facts about the states that have trade offices and the countries where these offices are placed.

[4]Interview with Katherine Lee conducted by the author, May 1, 2008.

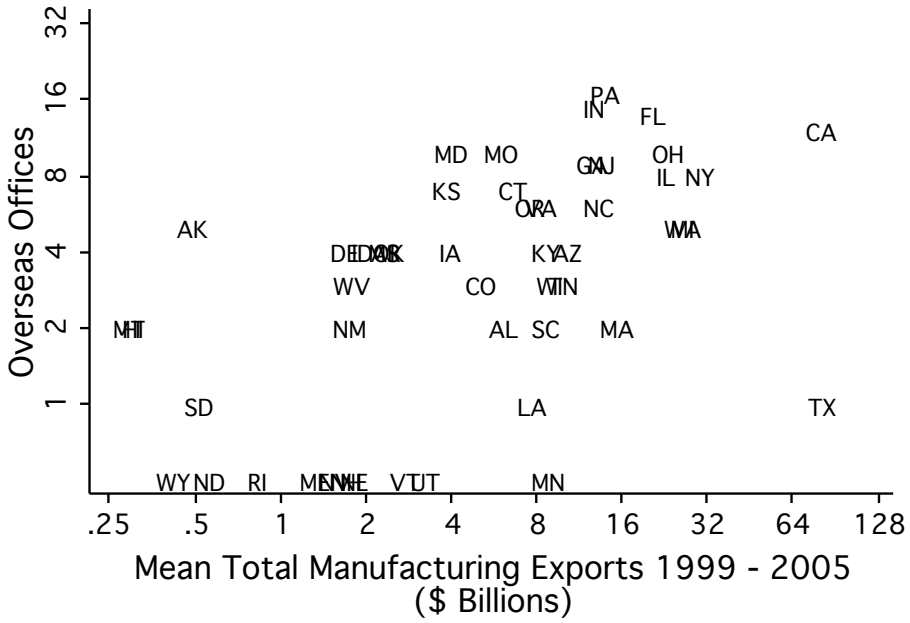

Figure 1. Total real exports vs. the number of overseas offices, by state. Exports are each state's manufacturing exports to the 176 countries in the sample. Axes are log base 2 scale.

In 2002, there are 228 overseas offices with 40 states having at least one office. The states without an office: Maine, Minnesota, North Dakota, Nebraska, New Hampshire, Nevada, Rhode Island, Utah, and Wyoming. The largest state, in terms of total exports without an office is Minnesota at $8 billion. Pennsylvania has the most offices with 17, followed by Indiana with 15. The smallest states to have at least one office are Montana and Hawaii, both at $0.25 billion in yearly exports. The average state has slightly fewer than five offices.

Figure 1 plots the number of overseas offices for each state against the total real world exports from that state. Exports, measured on the horizontal axis, are the average of real manufactured exports over 1999–2005. The most striking feature of figure 1 is the positive relationship between large exporting states and the number of offices. The correlation between the sum of a state's overseas offices and its total manufacturing exports is 0.33. The one observation that stands out is Texas. This is reconciled, however, with the fact the majority of Texas exports are to Mexico, where is has its sole overseas office.

There are 31 countries in the world hosting at least one overseas office. This is less than 20% of countries of the 176 countries in the sample. By far the most popular country for overseas offices is

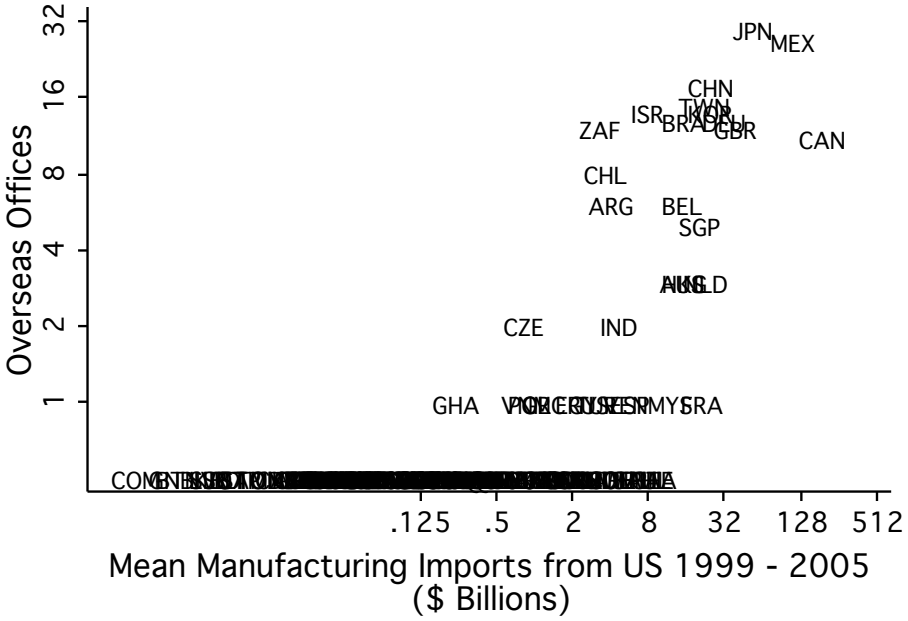

Figure 2. Total real manufacturing imports from the 50 states in the sample vs. the number of overseas offices, by country. Axes are log base 2 scale.

Japan. There are 30 offices located there, indicating almost every state that has at least one office has an office in Japan. The states that have at least one office, but do not have an office in Japan are Connecticut, Hawaii, Idaho, Louisiana, Massachusetts, New Mexico, Oklahoma, South Dakota, Texas, and Wisconsin. The next most popular countries are Mexico with 27 offices and China with 18 offices.

As seen in figure 2, states choose to place overseas offices in countries importing a relatively large amount of U.S. manufacturing. The correlation between the sum of offices located in a country and the total amount of manufacturing imports received from the United States is 0.65. The largest country to not have an office located there is Italy, with $5.8 billion in imports, followed by Switzerland, the Philippines, and Ireland at just under $5 billion. The smallest importing country to have an office is Ghana (with office placed by Missouri), followed by Vietnam (Oklahoma). Deviations such as Canada can be accounted for by the fact that states that trade the most with Canada such as Indiana, New York, Ohio, and Pennsylvania all have offices there whereas states not trading with Canada much such as Arizona and New Mexico do not.

Figures 1 and 2 establish two stylized facts: bigger exporting states tend to have more offices

and bigger importer countries tend to have more offices. The forty states with at least one office export on average $10.5 billion per year, whereas the average yearly exports of the ten states without an office is $1.9 billion. Countries with at least one office average $12 billion in imports whereas those that do not average $0.44 billion. This is consistent with Cassey's (2008) claim that states do not use export promotion policies to open new markets, instead focusing on already strong relationships.

The largest state-country export pairs that do not have an office are Texas-Canada at $7.3 billion and California-Canada at $7.2 billion. Of the top five trading pairs without an office, Canada is a member of four. Fifty percent of offices are involved in state-country pairs exporting at least $202 million; ninety percent of offices are involved exporting at least $19 million.

One may criticize these findings as simplistic because they do not consider other state or country characteristics such as access to water, colonial history, immigration patterns, and education. However these factors are implicitly considered when firms decide in which states to locate and to which countries to export. Furthermore country characteristics such as tariffs are the same for all states. They cannot account for the differences in states' overseas office locations.

4 A Model of Overseas Office Locations

Consider an environment, similar to Holmes (2005), in which there are I states with potential exports to J countries. Exports from state i to country j are denoted X_{ij}. Exports are exogenous; taken as given and not affected by the location of an overseas office.

There is a transaction or transportation cost, τ^0, for sending exports from state i to country j if state i does not have an overseas office in country j. The transportation cost is an iceberg cost. Thus the total cost of shipping X_{ij} units is $\tau^0 X_{ij}$. Note this formulation is consistent with the state export data whose value is measured at the port of exit. Also note the transaction cost does not depend on state or country characteristics.

The benefit of an overseas office is a reduction of the transaction cost. If there is an office, then the transaction cost is $\tau^1 < \tau^0$. One may interpret this reduction of the transaction cost as the savings to firms by matching with a good foreign importer rather than just any importer, who may

refuse to pay or other nefarious activities. Another interpretation is exporting firms will have to incur fixed and variable costs to export such as hiring translators. The overseas office coordinates these activities so fewer translators are needed to service exporting state firms, and thus aggregate state export variable costs diminish.

There is a fixed cost, paid by the state, for having an overseas office. This fixed cost has a state component, ϕ_i, and a country component, ω_j. State i must pay ϕ_i regardless of which country it opens the office. This represents the quality of the bureaucracy of the state. Also any state that opens an office in country j must pay ω_j. This represents the cost of operating any office there.

In addition, assume there are two random costs for each state-country pair. The first random cost must be additively paid if there is not an office of state i in country j. It is denoted ε_{ij}^0. The second random cost must be additively paid if there is an overseas office between the the two. It is denoted ε_{ij}^1. The state knows the realization of these costs.

The random costs are two independent realizations of the same random variable E drawn from a minimum Gumbel (type I extreme value) distribution:

$$\Pr(E \geq u) = 1 - F(u) = e^{-e^u}. \tag{2}$$

The Gumbel is chosen because it is the distribution of the minimum cost realized by having larger state-country pairs taking proportionally more draws from an exponential or extreme value distribution than a smaller state-country pair.

The problem facing the state government is cost minimization: given exports to each country, is it cheaper for the state to have an overseas office and accrue the coordination savings or is it cheaper to not have an office and forgo the office fixed cost. Given $\{X_{ij}\}_{j=1}^J$, each state i chooses the set of office locations $L_i \subseteq \{1, 2, ..., J\}$ to solve:

$$\min \sum_{j \notin L_i} (\tau_0 X_{ij} + \varepsilon_{ij}^0) + \sum_{j \in L_i} (\tau_1 X_{ij} + \phi_i + \omega_j + \varepsilon_{ij}^1).$$

To make the model simpler for estimation purposes, I add two independence assumptions. The first deals with the independence of the location of other offices and the second deals with the

independence of the distribution of the random terms.

Assumption 1. *There are no national spillovers for overseas offices.*

In other words, there is no transaction cost benefit for exports to France from an office in Germany.

Assumption 2. *There is no state spillovers for offices.*

The fixed cost for an office does not depend on how many other states have an office in that country.

With assumptions 1 and 2, the office location for each state-country pair is independent of all other pairs. For each state i, the problem reduces to nothing more than a country by country cost-benefit analysis of opening an overseas office and incurring the fixed costs versus the savings in transactions costs and random costs. The necessary and sufficient condition for the existence of a state i office in country j is that the relationship

$$0 \leq (\tau^0 - \tau^1)X_{ij} - \phi_i - \omega_j + (\varepsilon_{ij}^0 - \varepsilon_{ij}^1) \tag{3}$$

must be satisfied. At equality the state is indifferent between having an office or not. I assume a state will always open the office when facing equality. The probability of (3) holding, and thus the probability of there being an overseas office conditional on the independent variables, is logistically distributed;

$$\Pr(office_{ij}) = \frac{\exp\left((\tau^0 - \tau^1)X_{ij} - \phi_i - \omega_j\right)}{\exp\left((\tau^0 - \tau^1)X_{ij} - \phi_i - \omega_j\right) + 1}. \tag{4}$$

The independence assumption seems out of place given the details of office arrangements in section 2. Nonetheless they are useful for simplicity. Regression fits in section 5 will determine if these assumptions are not consistent with the data.

The exogeneity of exports assumption may appear strong. It is not. Underneath the assumption of exogeneity of exports are individual state and country terms as well as a state-country match term. Instead of the exogeneity of X_{ij}, assume states vary exogenously in export sales to the world and countries vary exogenously in imports received from the United States. One may think of this as saying firms vary exogenously in employment and markets vary exogenously in population. Then $X_{ij} = q_i n_j d_{ij}$, where q_i is the share of state i exports to the world, and n_j is the market size share,

that is, the percent of U.S. exports going to country j. The d_{ij} term captures all bilateral state-country features that are important for exports. This includes distance, colonial past, language and cultural ties, immigration patterns, mistakes, and unobservable match features relevant for exports. The lack of subscripts on τ is due to this way of modeling X_{ij}.

Substituting $X_{ij} = q_i n_j d_{ij}$ makes clear (3) is more likely to be satisfied when there is a large exporting state (large q_i), or a large importing country (large n_j). Thus the model predicts the stylized facts established in section 3. State-country exports is the source for the variation in the model allowing for estimation.

5 Logit Estimation and Results

The terms $(\tau^0 - \tau^1)$, ϕ_i, and ω_j from (4) may be estimated using standard logistic regression. The distributional assumption (2) means $\varepsilon_{ij}^0 - \varepsilon_{ij}^1$ has a logistic distribution with mean zero. Therefore the regression is

$$logit(office_{ij}) = \alpha + \beta X_{ij} + \sum_{i=1}^{39} \delta_i S_i + \sum_{j=1}^{30} \gamma_j C_j + \varepsilon_{ij} \tag{5}$$

where $\beta = \tau^0 - \tau^1$and $\varepsilon_{ij} = \varepsilon_{ij}^0 - \varepsilon_{ij}^1$. The coefficients δ_i and γ_j are on the state dummies S_i and country dummies C_j, respectively.

To estimate (5), I include an overall constant, α, and do not include the dummy variable for Hawai'i or Ghana. Once I have the estimates, I re-center the dummy variables so they show the extent to which each state, averaged over all countries, and each country, averaged over all states, differs from the universal average (Suits 1984). Only the forty states and the thirty-one countries with at least one overseas office are included in the regression. The others must be dropped because there is no variation in the dependent variable. For these cases, ϕ_i and ω_j may be set arbitrarily large.

The reported estimates in table 1 are impacts on the logit and not the impact on the odds ratio. Therefore the interpretation of the coefficient on exports means that a one billion increase in exports increases the odds ratio for having an office by a factor of $e^1.19 = 3.29$. To interpret the fixed effects, it is important to realize $\delta_i = -\phi_i$ and $\gamma_j = -\omega_j$. Therefore the odds ratio of Pennsylvania having an office anywhere in the world increases by a factor of 39 compared the

Table 1. Logit estimates of existence of an overseas office

$\beta = \tau^0 - \tau^1$	se	α	se	N	Score
1.19†	0.53	3.27†	0.37	1240	88.39%

Top 5 Costly States			Bot. 5 Costly States			Top 5 Costly Count.			Bot. 5 Costly Count.		
	$\delta_i = -\phi_i$	se		$\delta_i = -\phi_i$	se		$\gamma_j = -\omega_j$	se		$\gamma_j = -\omega_j$	se
TX	−19.13*	8.63	PA	3.38*	.49	FRA	−1.99	1.11	JPN	3.77*	.47
LA	−1.71	1.24	IN	2.98*	.55	VNZ	−1.73*	0.87	MEX	3.07*	.44
SD	−1.42	1.28	FL	2.71*	.52	MYS	−1.72	1.11	CHN	2.29*	.39
MA	−1.21	0.96	MD	2.08*	.54	TUR	−1.66	0.98	TWN	1.97*	.49
SC	0.92	0.74	MO	1.98*	.55	EGY	−1.56	1.08	ISR	1.93*	.33

Sources: OM data from WISER; Office data from Whatley (2003) and personal interviews.

Notes: The regression is $logit(office_{ij}) = \alpha + \beta X_{ij} + \sum_{i=1}^{39} \delta_i S_i + \sum_{j=1}^{30} \gamma_j C_j + \varepsilon_{ij}$. Only states and countries with at least one overseas office are included. Standard errors are robust.

† denotes statistically significantly from zero at 5% level.
* denotes statistically significantly from national average at 5% .

national average whereas the odds ratio decreases by a factor of 5 for Louisiana. Table 1 includes the top 5 and bottom 5 states and countries in terms of their deviation from the average. Given the relationship to ϕ_i and ω_j, the estimates on the dummies indicate the costs associated with opening an office in those states and countries. I report logits instead of odds ratios because the logits contain information I will soon use to get an estimate of the transaction cost savings from an office.

This estimator estimates the parameters giving the model the most number of correct answers to the questions "State i has an office in country j," compared to the data. Given the estimates in table 1, the score is 88.39%, or 1096 correct matches out of 1240 observations. The model predicts 172 offices compared to the 228 in the data. Of these 172 predicted offices, 128 are in locations matching the data. It correctly predicts 95% of the locations where there is no office. Compare these results to an alternative model in which there are no exports, just the state and country fixed effects. The score of that model is 87.74%, slightly worse than when exports are an explicit independent variable. This should not surprise since gravity equation estimates show individual state and country characteristics account for a large amount of exports. The score of a third model in which there are no fixed effects—only exports and a constant are on the right hand side—is 82.66%. In this case, the model predicts only 35 offices, getting the locations of 24 correct. Table 2 summarizes these comparisons.

Table 2. Goodness of fit comparison of models

Model	Score (%)	Offices	A (%)	B (%)
$\beta X_{ij} - \phi_i - \omega_j$	88.39	172	74.42	56.14
$-\phi_i - \omega_j$	87.74	174	71.84	54.82
$\beta X_{ij} - f$	82.66	35	68.57	10.53
Data		228		

Notes: Score is the percent of model's predictions that match the data. It is the number of correct offices plus the number of correct non-offices divided by 1240, the number of observations. Column A is the percent of the model's offices that are in the correct location. It is the number of correct offices divided by the number of predicted offices. Column B is the percent of the model's offices. It is the number of correct offices divided by 228, the number of offices in the data.

Given the scores of the alternative models shows robustness of the theory. Importantly, the high score indicates the assumptions on independence are not widely inconsistent with the data despite the preponderance of shared offices.

The estimates in table 1 cannot be interpreted because the probability of an office given in (3) remains the same if $(\tau^0 - \tau^1)$, ϕ_i, and ω_j are all multiplied by a constant. To get scale, one may use data on cost of operating state offices to pin down the values of these estimates for interpretation.

I obtain the 2007 cost of Hawaii's two trade offices (Department of Business 2008). After deflating to 1982 dollars, Hawaii's overseas office in China costs \$84,362.78 and the office in Taiwan costs \$67,994.15 annually.[5] Therefore $\phi_{HI} + \omega_{CHN} = \delta_{HI} + \gamma_{CHN} + \alpha = 84,362.78$ and $\phi_{HI} + \omega_{TWN} = \delta_{HI} + \gamma_{TWN} + \alpha = 67,994.15$. The average is \$76,178. Compare this to the estimates for ϕ_{HI}, ω_{CHN}, and ω_{TWN} obtained from (5). The average estimated fixed cost of these two offices is 1.70. Thus $1.70a = 76,178$. Solving for a and applying this scaling factor to β gives \$53,305 per billion in 1982 dollars, about 0.005%. This is the estimated amount of savings per billion of exports from an overseas office. This value seems quite reasonable given the cost of operating an office is roughly \$75,000.

The model predicts there is a threshold level of state-country exports, $\hat{X_{ij}}$ satisfying $\beta X_{ij} = \phi_i + \omega_j$. This threshold depends on the state and country. Nonetheless, by using the estimate for β and assuming all overseas offices cost roughly the same at \$75,000, I find $\hat{X} = 1.41$ billion. In the data, only 46 state-country pairs achieve this level of exports and only 29 have offices, suggesting the

[5]For the years 1999–2005, Hawaii's real exports average nearly 14 million to China and 2.5 million to Taiwan.

Table 3. Benefit estimates from differing samples

Sample	N	Offices	β	se	Benefit ($1982)
All states & countries	1240	228	1.19†	.53	53,305
non-English	1080	190	1.93†	.55	95,184
no FL & TX	1178	213	1.20†	.53	53,146
no Ag & mining states	841	195	1.14†	.55	–
Weighted	1240	228	0.67†	.18	18,122
Weighted non-English	1080	190	2.80†	.63	76,350

Notes: The model in all cases is $logit(office_{ij}) = \beta X_{ij} - \delta_i - \gamma_j + \varepsilon_{ij}$. Standard errors are robust. Benefit is the estimated transaction savings per billion in exports.

† denotes statistically significantly from zero at 5% level.

benefit of offices is greater than the regression indicates. The state and country terms in the office fixed cost, as well as the random terms, mean there is not a unique threshold level of exports above which a state would locate an office and not otherwise. Nonetheless $1.41 billion is informative as a ballpark figure for the threshold exports needed for an overseas office.

Because the data shows the largest trading pairs without an office often involve Canada and other primarily English speaking countries, I repeat the logistic regression dropping Australia, Canada, South Africa, and United Kingdom. If the benefit of overseas offices is due to their ability to provide information on contacts, legal procedures, and marketing, then is it reasonable this is most effective in non-English speaking countries. Removing these four countries drops the number of observations to 1080 and the number of offices to 190. Not surprisingly, the benefit of overseas offices increases significantly to 1.931* (0.545) with a score of 89.35%. Using the same procedure to get the scaling factor as before yields the savings per billion of exports as $95,184, an increase of 78%.

Cassey (2006) finds the OM data is of good enough quality to use for origin of production of state exports at the state level with possible consolidation problems affecting Florida and Texas. With this in mind, these two states are dropped and the logit regression repeated. Results are essentially identical as in table 1.

There is a possibility the estimates reported in table 1 are biased because the overseas offices of some states may be primarily involved with agricultural or mining exports. The export data is manufacturing only. When the sixteen states for which agriculture and mining compose more than

10% of the Gross State Product are removed, the results are essentially identical to table 1 again.[6]

When the logit regression is repeated with observations weighted by the product of total state manufacturing exports and total manufacturing imports received from the United States, the results change significantly. In this case, $\beta = 0.669^*$ (0.181). Using the same procedure to get the scaling factor as before yields the savings per billion of exports as \$18,122. This estimate is spurious because if it were true, it would mean Hawai'i's office is more in fixed costs than it saves in transaction costs, and thus a violation of the major assumption of the model. If however, this weight is applied to the sample of twenty-seven non-English speaking countries, then $\beta = 2.800^*$ (0.630). The estimated benefit from an overseas office per billion in exports is \$76,350. The corresponding export threshold is \$0.99 billion.

Given the results from the different samples, summarized in table 3, I take the range of estimates not including the highest and lowest to be most plausible. Dropping the sample of all states and countries weighted by size and the sample of non-English speaking countries only gives a range of values of the benefit of overseas offices ranging from \$50,000–\$94,000, or 0.005%–0.009%. The corresponding threshold level of exports needed to make an office worthwhile is between \$1–\$1.4 billion.

For comparison with the extensive gravity equation literature, I estimate the coefficient on an office dummy using the same sample of forty states and thirty-one countries in a standard log-linearized gravity equation. Distance is the great circle distance in miles from the state's 2000 population centroid to the capital city of the country. When using the standard gravity specification, the coefficient on the office dummy is 0.577 (0.082) with R^2 of 0.70. This indicates the average office increase state-country exports by 58%. This seems implausibly large. When being more careful for causality bias and correcting for individual state and country characteristics using fixed effects, the office dummy coefficient plummets to a more plausible 0.092 (0.062) with $R^2 = 0.91$. However, the office coefficient is now not significant at the 5% level. Therefore it seems the volatility of the state export data is such that plausible estimates for the impact of an overseas office on exports cannot be distinguished from the noise in the data.

[6]The states in order of most agriculture and mining as a share of GDP are Alaska, Wyoming, North Dakota, New Mexico, Louisiana, Nevada, Texas, Oklahoma, West Virginia, South Dakota, Hawaii, Nebraska, Idaho, Colorado, and Kansas.

6 Conclusion

Many U.S. states publicly invest in exports by placing overseas offices in foreign countries. These offices coordinate legal and marketing activities for domestic firms exporting. The small existing literature does not agree as to whether overseas offices, or export promotion in general, has any impact on exports.

I create a data set for overseas office locations for all 50 U.S. states for the year 2002 by supplementing published data with personal interviews with state development agencies. I combine this office data set with the Origin of Movement state level manufacturing export data set. This data set provides destination information for exports. Therefore I have data on the location of both exports and overseas offices.

I adapt Holmes's (2005) model of sales office locations to an environment where a state government minimizes the cost of selling an exogenous amount of exports by choosing between the transaction cost savings from having an office and the fixed cost of operating it. The model posits a transaction cost of exporting. Overseas offices are modeled as reducing this transaction cost, a reasonable choice given the activities of these offices. The model also posits two random costs associated with each state-country pair representing the quality of the match between the partners with and without and office. Using two independence assumptions, the model's solution is a simple benefit versus cost condition. Together with the random matching cost, this condition yields the probability of a state locating an office in some country as a function of exports and state and country characteristics. The solution accounts for stylized facts in the data such as that large exporting states tend to have more overseas offices and countries importing larger amounts from the United States tend to have more overseas offices.

As the probability of an office existing is logistically distributed, I exploit the differences in where states locate their overseas offices to estimate the impact of exports on the log odds ratio of the existence of an office. The high score of the model suggests the two independence assumptions used in solving the model are inconsequential with respect to the data. I use data on the cost of operating two of Hawaii's overseas offices to get the transaction cost savings. Depending on the sample and weight of states and countries used in the regression, the benefit of overseas offices

plausibly ranges from 0.005%–0.009% of exports. The corresponding threshold level of exports needed to make an office worthwhile is between $1–$1.4 billion.

These estimates extend the findings in Cassey (2008). That paper contains a model with micro-foundations theoretically and empirically showing an economically significant relationship between exports and public investment at the state-country level. However Cassey is unable to get an estimate for the benefit of the public investment, in his case governor-led trade missions. This paper is an improvement because the data is better suited to the theoretically justified regression. It also makes explicit into the theory the matching considerations reported in Cassey. This is among the first to bring such matching considerations into the field of international trade.

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Appendices

A Overseas Office Data

The data on overseas office locations comes from appendix A (pp. 49–51) of Whatley (2003). Whatley reports the answers from the a survey conducted by the States International Development

Organizations (SIDO) in 2002. The actual survey is not included in the report and could not be located. The only information reported by Whatley is the office location by state. There is no information on office budgets, employees, whether it is a shared office or not, programs and services, or years of existence.

Whatley's report gives office location information for 44 of 50 states, including some states that do not have any overseas offices. The six states not participating in the survey: Hawaii, Massachusetts, New Hampshire, North Dakota, Oklahoma, and Vermont. The survey data are supplemented with personal interviews I conducted during the spring of 2008 as well as the information published on state websites. These interviews established 2002 overseas office locations for Hawaii, North Dakota, New Hampshire, and Massachusetts. Information on office location for Oklahoma could only be established back to 2003. The location of Oklahoma's overseas offices has been stable, with no changes from 2003–2008. Thus I use the four 2003 locations for 2002. Vermont is not considered because no information about its offices was obtained.

The overseas office definition in section 2 uses the following rules:

- Must be a physical office in a foreign country.
- Must promote exports or attract FDI. Other activities such as tourism are allowed but not necessary.
- Employees can be full or part-time, but the their responsibilities as a state representative must be primary. I do not count volunteers or consuls that are located overseas for some other reason and agree to act as a representative of the state.
- Regional trade offices count only for the country in which they are physically located.
- Multiple states sharing a trade office are each counted separately.
- If a state has more than one office in a country it is counted as having one office. There is only one instance of this: Pennsylvania had separate offices for investment and exports in the United Kingdom in 2002.

In addition, Maine says it does not have any overseas offices in 2002. It did, however, have a branch of the state chamber of commerce in Germany. I cannot ascertain what the difference between an overseas office is and a foreign-located chamber of commerce branch. Nonetheless, I take Maine at its word, thus making it devoid of overseas offices in 2002.

The following is a list of phone interviews conducted by the author.

- Dessie Apostolova (Director, Oklahoma International Trade Offices), April 28, 2008.
- Kathryn Lee (Deputy Director, New Hampshire Office of International Commerce), May 1, 2008.
- Julian Munnich (Director of Administration, Programs and Inbound Investments, Massachusetts Office of International Trade & Investment), May 1, 2008.
- Lindsey Warner (Marketing and Events Coordinator, North Dakota Trade Office), April 28, 2008.

The following is a list of email correspondances conducted by the author.

- Dana Eidsness (Director of International Trade, Vermont Department of Economic Development), June 23, 2008.