Transport, Processing and Information:
Value Added and the Circuitous Movement of Goods

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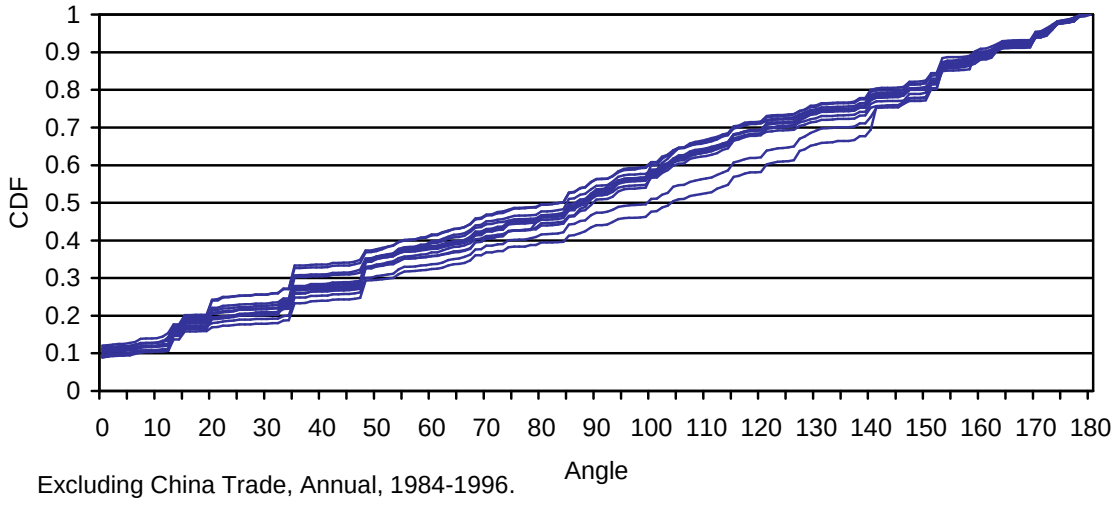
I. Introduction

Goods move in circles. Excluding trade with China, between 1984 and 1996 an average of 15% of the annual value of Hong Kong re-exports originating in the United States, i.e. goods from the United States which were not "substantially" transformed when they passed through Hong Kong, ended up being shipped to…the United States. In 1996 the value of such goods was about US$ 400,000,000. Similarly, of Hong Kong re-exports originating in Israel, an average of 65% were subsequently shipped to…Israel (1996 value of US$ 115,000,000). When not moving in circles, goods follow acute angles. Figure I below graphs the annual cumulative distribution function of the spherical angles described by the country of origin, Hong Kong, and the country of destination of Hong Kong's non-China related re-export trade. On average, about 50% of Hong Kong's non-China re-export trade followed an angle of less than 90^{o}.[1]

Figure I: Cumulative Distribution Function of Angle of Hong Kong Re-exports



Excluding China Trade, Annual, 1984-1996.

[1]I exclude China from the Figure because, given Hong Kong's proximity to the Mainland, the angle of re-export trade originating in or destined for the People's Republic is strongly influenced by the location point used to represent "China." For more distant economies, however, the angle provides a crude, if whimsical, measure of the degree to which Hong Kong lies en route from the origin to the destination. As the Figure indicates, on average about 10% of the annual value of non-China related trade followed an angle of 0 degrees, i.e. returned to the origin. Section II provides greater detail on the role of China vs. non-China trade and their relative propensity to round trip.

Table I: Share of U.S. Waterborne Trade Laded/Unladed in a Country other than the Origin or Destination						
	Imports			Exports		
	Weight	Value		Weight	Value	
		Total	Exc. China		Total	Exc. China
1990	0.09	0.14	0.11	0.04	0.10	0.10
1991	0.10	0.16	0.11	0.03	0.09	0.09
1992	0.10	0.18	0.12	0.04	0.09	0.09
1993	0.09	0.18	0.12	0.04	0.10	0.09
1994	0.10	0.19	0.12	0.04	0.10	0.09
1995	0.11	0.20	0.13	0.04	0.10	0.09
1996	0.11	0.24	0.17	0.04	0.10	0.09
1997	0.12	0.22	0.15	0.04	0.09	0.09

Table II: Average Distances (Radians/Tonne) – U.S. Waterborne Trade						
	Indirect Imports			Indirect Exports		
	Actual Distance	Direct Distance	Excess Distance	Actual Distance	Direct Distance	Excess Distance
1990	1.74	1.38	0.36	1.77	1.38	0.40
1991	1.66	1.34	0.31	1.57	1.32	0.24
1992	1.69	1.33	0.36	1.69	1.43	0.26
1993	1.74	1.35	0.39	1.71	1.40	0.31
1994	1.70	1.32	0.39	1.70	1.41	0.29
1995	1.74	1.30	0.44	1.70	1.40	0.30
1996	1.69	1.30	0.39	1.69	1.38	0.31
1997	1.57	1.28	0.29	1.68	1.35	0.34
Average	1.69	1.33	0.37	1.69	1.38	0.31

En route from their productive origin to their final destination, goods, apparently, are unloaded and reloaded at out of the way locations. As Table I above indicates, during the 1990s an average of about 10% of the weight of U.S. waterborne imports were reported as having been laded in a country other than the country of productive origin. While the weight share of third party lading was fairly constant, its value share was not, rising rapidly from 14% in 1990 to 22% in 1997. As the Table shows, this sharp positive trend was not merely due to trade with China (much of which is laden in Hong Kong). With regards to exports, the share of goods whose first, projected, unlading was other than the country of destination has remained constant at about 4%

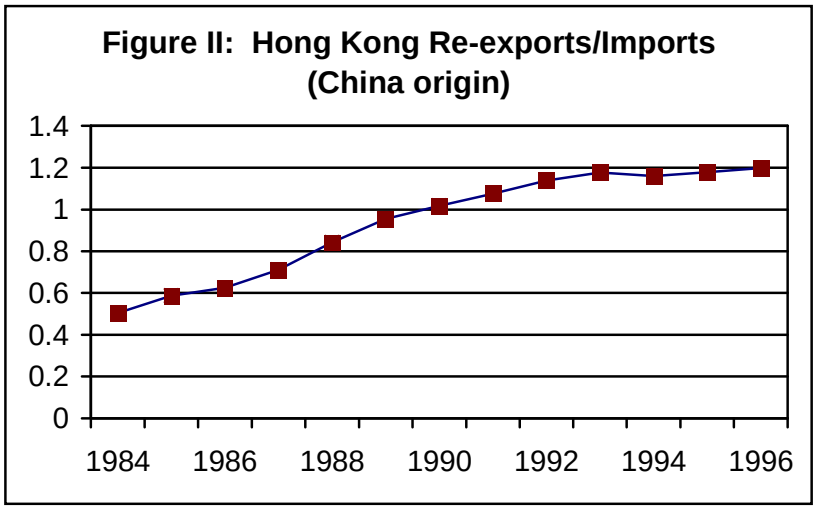
of the weight and 10% of the value of total exports. On average the indirect routing of imports added an excess distance of .37 radians to what otherwise would have been a direct distance of 1.33 radians, with similar distances for exports (Table II).[2]

While following circuitous paths, and being unloaded and reloaded, goods mysteriously gain value. On average the value to weight ratio of U.S. waterborne imports whose final lading was in a country other than the country of origin was 12.2% greater than the value to weight ratio of the same products travelling directly from the same origin.[3] Similarly, the value to weight ratio of U.S. waterborne exports whose first projected unlading was in a country other than the country of final destination was 7.6% higher than the value to weight ratio of the same products travelling directly to the same destination.[4] Perhaps the greatest evidence of the value increasing effect of circuitous transport is given by Hong Kong's China related re-exports. Figure II below graphs the ratio of the value of Hong Kong's re-exports originating in China to the value of total Hong Kong imports from that country, whether intended for domestic use or re-export. In the mid-1980s, this ratio was fairly low as, at that time, imports from China mostly served Hong Kong's domestic needs. However, as the re-export trade expanded, the crude aggregate data clearly revealed the value enhancing effect of transit. By the early 1990s the value of re-exports

[2]As explained further in Appendix I, these distances are based upon the minimum distance spherical paths, subject to polar restrictions, between principal cities. One radian is about four thousand miles. The Hong Kong re-export distances and excess distances are similar.

[3]Specifically, if P(p,o,h) denotes the value to weight ratio of imports of a product p from origin o last laden in country h, the figure cited in the text equals $\Sigma \ln[P(p,o,h)/P(p,o,o)]/N$, where the summation is across all $h \neq o$, all o, and all p (defined at the Harmonized System 6-digit level), and N equals the total number of such observations. Alternatively, one could aggregate the value and weight of all indirect shipments (through all $h \neq o$) of a particular product from a particular origin before estimating the average ln price increase. Measured in this fashion, the average value to weight ratio of indirect imports is 3.8% greater than that of direct imports. For indirect exports, discussed in the text above, the aggregated indirect shipments value to weight ratio is, on average, 4.2% greater than that for direct shipments. These figures are simply meant to be illustrative of the issue at hand. Section III, later on, provides a more systematic analysis of the impact of indirect shipment on prices.

[4]These calculations are based upon customs valuations, i.e. are exclusive of transport costs beyond U.S. borders.



originating in China exceeded the total value of all imports from the People's Republic, whether for domestic use or re-export, by a healthy 20%. With imports originating in China equalling almost 50% of GDP, this "margin" amounted to about 10% of the aggregate value added in the Hong Kong economy. To put this number in perspective, by 1996 the total value added of Hong Kong manufacturing was only 7% of GDP. [5]

Why do goods moving from an origin to a destination transit through out of the way third party locations, and why does their value change when they do so? In this paper I focus on three explanations of circuitous movement: (1) the movement of the goods (transport); (2) the transformation of the goods (processing); and (3) the marketing of the goods (information). "Transport" simply maintains that the circuitous paths one observes in the data provide the least cost means of shipping goods from the origin to the destination. The cost savings that allow circuitous transport through hubs to compete with more direct shipments might emerge from

[5]This is not the first paper to note the markup of Chinese goods moving through Hong Kong. Feenstra et al (1998a, 1998b), Fung and Lau (1998) and Lardy (1994) make use of various estimates of this markup to adjust the China-U.S. bilateral trade balance for the value added of Hong Kong re-export operations. I should note that Hong Kong imports are measured cif while re-exports are fob, so, at least nominally, the crude "margin" mentioned above does not include transport costs.

economies of scale, which lower the cost of shipment, despite the greater length of the route. In contrast, "Processing" maintains that goods follow circuitous routes not because these provide the most advantageous means of transport but because the, otherwise, out of the way third party locations allow for economically profitable processing. International conventions do allow a product to be processed, to some small extent, without changing its country of origin and, in any case, shippers might mis-declare the true degree of transformation as a means of avoiding country-specific trade barriers.

A third explanation, "Information", begins with the observation that within economies the reconciliation of supply with demand seems to require the services of middle-men, i.e. wholesale and retail establishments, which physically divert goods in the process of matching sellers and buyers. When an individual goes to a retailer to buy a couple of shirts or a supermarket goes to a wholesaler to buy a truck of vegetables, they usually find that the goods they seek have been brought into the establishment, leading to circuitous transport as, after the transaction is completed, the goods are carried back to the point of origin of demand. Further, goods, between the time they enter and the time they leave wholesale and retail establishments, mysteriously increase in value, with minimal apparent transformation. Value added in wholesale & retail trade stems from the matching services these provide and this matching, within a country, appears to require a concentration of goods at the point of concentration of information. In this sense, the data cited above seem to be merely the international extension of a well-known, although not well-analyzed, service activity within economies.[6]

[6]It is beyond the scope of this paper to provide a compelling analysis of wholesale & retail trade. Nevertheless, I would hazard two arguments: First, economies of scale in transport might encourage the concentration of incoming goods shipments at certain points (prior to their distribution throughout the locale) and matching activity would naturally tend to occur at these points of concentration. Similarly, a node of matching activity would tend to draw in goods which, if there are economies of scale in transport, would lead to a reinforcing concentration of goods shipments. However, if the two activities are not intimately linked, then the one cannot explain value added in the other. Specifically, while economies of scale in transport might generate unusual rents

The preceeding explanations are by no means mutually exclusive and, if anything, are actually mutually reinforcing. Economies of scale in transport can lead to a concentration of shipments at a particular hub which, as goods are already being unloaded and reloaded between vessels, then becomes a natural point for transformation. Similarly, a concentration of shipments to and from all regions at a particular port brought about by economies of scale will lead to a concentration of information about patterns of supply and demand, making the port a natural wholesaler.

The three explanations differ substantially, however, in their intellectual implications. If transport is the dominant force behind the phenomena described earlier above, then there is no product value added in the hubs themselves,[7] and these data, while enhancing our knowledge of transport, have no serious implications for our understanding of international trade. If, however, processing is important and the "rules of origin" are being obeyed, it would seem that the international division of labour is extremely fine, as goods are shipped great distances to undergo seemingly small physical changes. Even if rules of origin are being violated, it is still, nevertheless, clear that the value added generated in these operations, outside of the country of origin, is large, which suggests that our existing conceptual and practical criteria for defining

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for the owners of the land at the point of shipments concentration, they do not explain the value added of wholesale & retail establishments. Consequently, an understanding of the price changes associated with goods entering and leaving wholesale & retail trade establishments requires more than an appeal to economies of scale in transport.

Second, I would argue that the transitory nature of information requires that goods be concentrated at the point where matching occurs. If customer demand is inherently transitory then, when a match is made, a customer will want to take immediate possession of a good. Similarly, if producer characteristics (quality) are transitory, then when a matchmaker identifies a producer, he will want to take immediate possession of the goods (for later distribution to customers). In sum, if the characteristics of demand and supply fluctuate, matchmakers will tend to be become inventory holders. In contrast, in situations where the characteristics of demand and supply are highly persistent, matchmakers need not keep goods inventories on hand and can, instead, simply connect sources of demand directly to sources of supply (after acquiring the maximal rent associated with the revelation of information).

[7]Naturally, there is the value added associated with the port services, and there are also likely to be rents arising from the hub's position as a focal point for shipments. Both of these, however, can be subsumed under the standard "transport costs" of trade theory.

origins and destinations, all of which are central to the testing and development of trade theory, are problematic. Finally, if information plays an important role in determining the movement of goods and the changes in their prices, then our concept of trade has to be broadened to include an understanding of the spatial dimension across which markets clear, of the linkage between trade in goods and trade in information. There might be substantial trade in services hidden in the pricing of trade in goods.[8]

The objective of this paper is fairly modest. It is my intent simply to establish that transport alone cannot explain the circuitous movement of goods, to provide sufficient evidence to convince the reader that processing, and perhaps information, is an important motivating force behind the Hong Kong and U.S. data. At first glance, it would seem that this objective is already accomplished. When goods are shipped indirectly their prices change (i.e. rise), which is indicative of value added. In the case of Hong Kong, the amount of this value added is enormous, at least 10% of GDP for China imports alone, and exceeds the value of domestic manufacturing. Consequently, processing, which would appear as value added in manufacturing, cannot be the entire explanation, and some weight must be put on incomes derived from matchmaking services. This would seem to complete the argument. Unfortunately, transport charges can lead to apparent price changes which, combined with some misreporting, could explain all of the phenomena noted above.

Although apparently noted as early as John Stuart Mill,[9] in postwar economics the proposition that fixed transport charges would lead to a substitution toward higher quality shipments is most commonly attributed to Alchian and Allen (1964, pp. 74-75). Alchian and

[8]It is well known, of course, that the prices of traded goods include a value added component which is derived from domestic, non-traded, services. The difference, in this case, is that an internationally traded service, i.e. matchmaking, is measured, in the trade statistics, as goods trade.

[9]"Supplementary Comment by J.S. Mill", Journal of Political Economy vol. 88, no. 1 (1980): 208.

Allen argued that if a region produces two varieties of a good, a premium, P, and a standard, S, with $P_P > P_s$, and both varieties incur a fixed charge of t to be transported out, then consumers, at the receiving end, setting the ratio of the marginal utilities equal to the relative prices, will shift their relative demand in favour of the premium good. The further goods travel, the more the composition of shipments will shift in favour of the premium good or, in the vernacular, "the good Washington Apples are the ones that are shipped out." The theoretical validity of this proposition depends on the absence of strong income effects and on limitations on the cross-price elasticities of demand between the two goods and other elements of the consumption bundle.[10] It also competes against an alternative model, that of "freight absorption", in which a monopolistic producer of a homogenous product, selling to different locations, charges lower prices to customers located at greater distances, i.e. absorbs some of the freight costs associated with the more distant shipment.[11]

If the Alchian-Allen conjecture holds, a simple comparison of the prices of a hub's imports and re-exports can generate the mistaken impression of product value added. Since the hub's re-exports are incurring greater transport costs than its imports from the same origin (as they are travelling further on), the composition of re-exports will be weighted toward higher quality products.[12] Admittedly, no amount of sorting can explain why the aggregate value of Hong Kong re-exports from China exceeds the aggregate value of imports, including re-exported

[10]See Gould and Segall (1969) and Borcherding and Silberberg (1978). For example, if there is a third composite good which is a complement to the standard good, but a substitute for the premium good, then demand could easily shift in favour of the standard good.

[11]See Tirole (1988), pp. 140-141. Unconstrained maximization by the monopolist does not necessarily imply freight absorption. However, the opposite, i.e. price discrimination against more distant consumers, is ruled out by arbitrage between locations. This leaves non-discriminatory pricing and freight absorption as the only remaining possibilities.

[12]Thus, while Chicago might import moderate and good quality apples from Washington State, only the better quality apples will be shipped on to New York.

goods, from that country. To explain this aspect of the data, however, one might simply argue that Chinese firms use transfer pricing to create artificial profits in Hong Kong, which provides a highly favourable tax and legal environment.[13] In a comparison of import and re-export prices, a combination of goods sorting and transfer pricing will generate the impression of product value added, where nothing more than innocuous transport is at play.

To generate the appearance of value added in a comparison of indirect and direct goods shipments destined for the same terminal market, as in the case, say, of United States imports, the Alchian-Allen conjecture has to be supplemented with some assumptions about transport opportunities. If direct and indirect transport shipments depart from an origin at the same time, it seems safe to assume that the total transport time of the indirect routes, with their multiple ladings and greater route length, will be greater. Thus, if direct transport opportunities are always available, the only way that indirect transport can co-exist in an equilibrium driven by transport considerations, alone, is if they offer lower transport charges. With the total cost of transport given by its financial cost and the inventory cost of time, which is proportional to the value of the goods, the cheapest goods will actually find it most advantageous to travel along indirect routes, while the premium goods ship on the direct routes. This type of sorting, driven by the different components of cost, does little to explain the facts above. If, however, direct transport opportunities are infrequent, then shippers may take indirect routings, even if the

[13]I would actually argue that during the reform period Chinese firms have had a strong incentive to *overstate* the value of exports, as this gives them the legal right to use foreign exchange (some of which might be acquired on the black market) to bring in imports. If one regresses the statistical discrepancy ("net errors and omissions") in the People's Republic's Balance of Payments accounts with the IMF (as reported in International Financial Statistics) on a time trend and the annual value of declared exports during the period 1982-1997, one gets an exports coefficient of -.09, t=3.4. Thus, every dollar of declared exports appears to have generated only 91 cents of foreign exchange. Further, one could point out that the tax holidays available to township and village enterprises and firms in the favoured Economic Zones are more advantageous than even Hong Kong's low corporate tax rate. Against these arguments, however, must be set the fact that profits generated in the Mainland are subject to predation by local and central government officials, which is not the case in Hong Kong's more stable legal environment. For reasons such as this, the problem of transfer pricing cannot be dismissed out of hand.

charges associated with these are actually greater. With the cost of transport dependent upon whatever routing is available in any given time period, a Washington Apples effect might arise, as on the days when only the more expensive, indirect, shipment opportunities are available the composition of shipments (and future consumption at the intended destination) shifts in favour of premium products.[14] With infrequent direct service, inventory costs will also encourage a movement of premium goods along indirect routes, as their lesser "dock waiting time" can more than offset the greater actual transport time. Thus, to explain the U.S. data one simply needs to argue that direct transport opportunities are infrequent, and that a Washington Apples effect or inventory carrying costs encourage the movement of premium goods on more expensive indirect routes.

In this paper I use data from Hong Kong and the United States to make the case in favour of "processing" and "information", and not merely "transport," interpretations of routing data. As data comparing transport charges on direct and indirect routings are rare, and lack sufficient detail and identification to allow one to confidently estimate a full model of the competition between direct and indirect transport, I take a two pronged approach: (1) Using the more widely available information on goods values to identify patterns of pricing that seem consistent with product value added and hard to justify as driven by transport and selection effects; and (2) Using the available transport cost data to estimate simple models of transport costs and selection, and show that these support the observations made using the pricing data.

I begin, in Section II below, by describing the different data sets. Section III then examines the price characteristics of goods moved on indirect routes. When compared with the

[14]Thus, if only one shipment opportunity between Washington and New York appears every year, in the years when this shipment opportunity is more expensive the composition of apple sales will shift in favour of the higher quality apples.

prices of goods shipped on direct routes, I find that the prices of goods which have followed circuitous paths are increasing in the excess distance traversed by that path. In contrast, the prices of goods departing, to follow a circuitous path, are *decreasing* in the excess distance.[15] These results are completely consistent with the notion of product value added, as goods which have followed circuitous routes are processed (higher prices), while those which are departing on such routes are, as yet, unfinished (lower prices), but are difficult to motivate with selection effects. I also find that roundtripping is a signal of value added, as goods which, generally, roundtrip a lot experience substantial price increases in the hub, even when shipped on to third party markets. In this section I also show that the price increases of Chinese goods passing through Hong Kong are not unusually high, given the characteristics of these shipments, i.e. there is no evidence that the markup of Chinese goods in Hong Kong is exaggerated for transfer pricing purposes.

Section IV turns to a more formal analysis of selection effects, per se. I find that there is little evidence that distances or transport costs shift the composition of shipments in favour of more expensive products, i.e. there is no Washington Apples effect in the data I have gathered. This makes it difficult to argue that the price changes observed when goods move through hubs, in particular, the price increases associated with Hong Kong re-exports and U.S. indirect imports, are generated by selection effects. Section V concludes the paper with estimates of the aggregate incomes generated in Hong Kong from its re-export activity. I relate these incomes to the size of Hong Kong's manufacturing sector and the value added of its import-export service companies,

[15]Thus, although indirect export shipments tend to involve higher priced goods in general, the prices of the goods are actually declining in the perversity of the route. Separate from the length of the routing, there appears to be a selection effect which raises the mean values of goods moving on indirect routes, whether incoming or outgoing. I am investigating this further, but, it seems that at least part of this is explained by issues such as containerization and the predictability, i.e. advance scheduling, of transport routes. I hope to address this further in later drafts.

making the case for the consideration of wholesale and retail trade as an internationally traded service activity.

II. Data

Country level data on international goods movements revolve around the following categories: exports, re-exports, imports and transits. Exports are outgoing goods whose productive origin lies in the reporting country, while re-exports are outgoing goods whose productive origin lies elsewhere, i.e. goods where the value added in the reporting country is insufficient to confer local origin. Imports are goods brought into the reporting country for local use, transformation or re-export. With the exception of duty free ports such as Hong Kong, data on imports destined for re-export are typically separated out from other imports as these goods usually circulate under bond. Finally, transits are goods moving from a country of origin to a country of destination which change vessel and/or mode of transport while in the reporting country. The operative distinction between re-exports and transits varies substantially from country to country, but generally revolves around the degree of customs clearance. Since transit goods do not pay tariffs or enter into measures of trade, the transit data usually only contain information on quantities, with valuations, when present, estimated using crude formulas imposed by statistical officials or shippers. Consequently, they are not well suited to the analysis of goods movements and price changes. I have collected information on the routing of Dutch, Hong Kong and U.S. transits, but leave their analysis to an appendix, available upon request from the author.[16]

[16]The principal result, in the analysis of these and other quantity data, is that there exist detailed product level attraction effects. That is, if a country h imports more of product i from an origin o and exports more of product i to a destination d, it also tends to transit more of product i from o to d, even if one controls for the aggregate volume of trade with o and d. This result is easy to motivate with value added explanations of goods movements, but seems less compatible with a transport explanation. In terms of "information," one might argue that imports and exports of a particular product signal knowledge about sources of supply and demand for that product. In terms of "processing," one could maintain that imports and exports of a particular product type signal comparative advantage in the processing of that product. For a "transport" explanation, however, one would need to argue that there exist economies of scale which operate at detailed product levels, with the cost of transporting a particular product through a hub being a decreasing function of the volume of trade in that product. Intuitively, this seems implausible. In my analysis of transport costs, however, I find that one cannot reject the possibility that there are, indeed, detailed product level economies of scale. There are problems with the endogeneity of some of the other coefficients in this

Table III: Routing Data			
	Hong Kong	United States (Waterborne)	
Level	Re-exports	Imports	Exports
Years	1984-96	1990-97	1990-97
Routing	O & D	O & Last Lading	D & 1^{ST} Unlading
Types of Data	Value & Units	Value, Weight & Charges	Value & Weight
Country Detail	160 "harmonized"	211 "harmonized"	
Product Detail	1785 SITC "harmonized"	HS-6 (Official Harmonized System)	

Notes: O & D = origin & destination; 1^{ST} = First; "harmonized" = categories with consistent boundaries. The number of products and countries denote the maximum number of consistent categories available, which is usually less than the number appearing in the routing data, particularly after these are merged with supplementary data sets (see analysis in later sections).

Table III above summarizes the routing data that form the basis of the analysis of this paper. Appendix I discusses sources and minor technical issues, but a few comments of a more general nature are appropriate at this time. First, I should note that in preparation for the analysis I have tried to gather data covering as many years as possible, not with the intent of exploiting the time series aspects of this information, but more in the spirit of gathering repeated draws of the same phenomena. As country boundaries and product definitions have evolved over time, this requires a reconciliation of the annual coding. I construct a consistent coding, which I term "harmonized", by agglomerating countries or products into their smallest common denominator, e.g. adding East and West Germany together prior to their union so as to match the geographic definition in place after 1990. This problem is most acute in the case of Hong Kong, where the SITC product code has evolved steadily on an annual basis and, more abruptly, when SITC2 was changed to SITC3. Using extensive documentation provided by the Hong Kong

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analysis and one can argue that their bias leads to a mistaken assessment of the level at which economies of scale operate (I discuss this further in a footnote in the Conclusion). Nevertheless, since the results, while interesting, do little to differentiate between the alternative hypotheses put forth in this paper, I relegate them to an appendix (under preparation).

government, I combine the several thousand evolving SITC codes present in the various years into their smallest common denominators, i.e. 1875 "harmonized" product categories.[17]

With regards to the specifics of the individual data sets, in Hong Kong re-exports are defined to be imported goods which are re-exported without having undergone a process that confers "Hong Kong origin", i.e. a process which:

> "changed permanently and substantially the shape, nature, form or utility of the basic materials used in manufacture. Such processes as simple diluting, packing, bottling, drying, simple assembling, sorting or decorating etc. are not regarded as genuine manufacturing processes." (Certificate of Origin Circular No. 14/96)

Exporters, in their trade declarations, are expected to use this general definition in determining whether a product is a re-export or a domestic export. For particular products, although not all, more specific guidelines are provided, which vary in their precision and degree of allowable value added. For example, for garments, the cutting of the fabric and sewing of cut pieces into the garment is deemed to confer origin, although the addition of small additional pieces onto an otherwise complete garment (e.g. sewing on of buttons) does not confer origin. For cameras, any activity where the value added is less than 25% of the final price of the product will not confer origin. In processing, the trade declarations are checked for consistency, e.g. the unit values are compared to the average unit values for the same commodities exported or imported from a particular country, and persons who knowingly lodge false declarations may be prosecuted. [18] When exporters report a goods shipment to be a re-export, they report both the destination and the country of productive origin, and this information forms the basis of my analysis.

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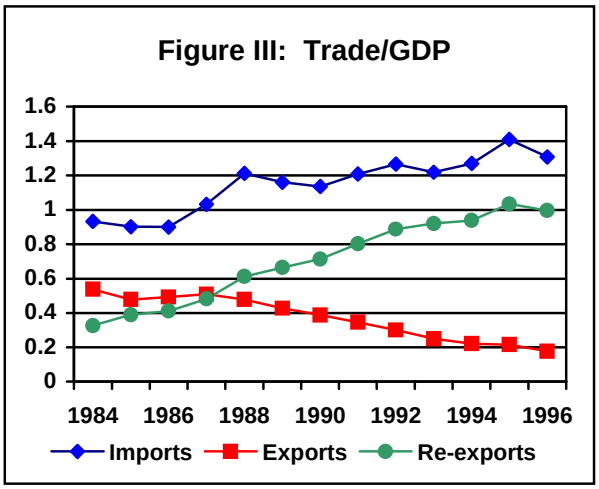
[17] In order to attain the greatest number of annual observations, I make use of the Hong Kong data in SITC coding. The Hong Kong government has recently informed me, however, that greater detail exists using a modified HS coding from 1988 on. I intend to use these data to further refine the level of consistent product detail.

[18] These examples and procedures are drawn from Certificate of Origin Circular No. 14/96 and personal communication with the Census and Statistics Department.



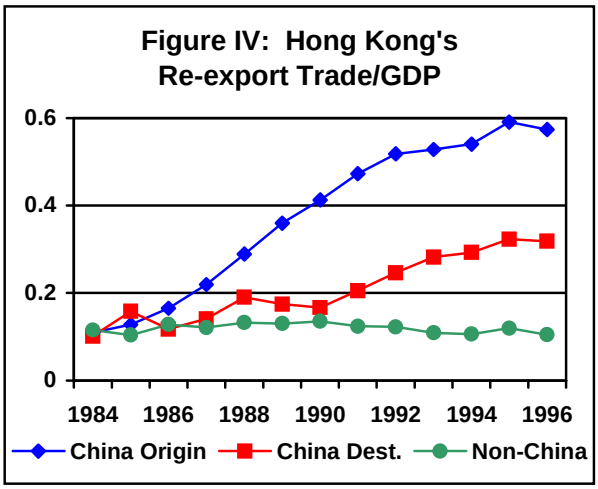


Figure III above provides information on trends in the pattern of Hong Kong's trade. During the 1980s and 1990s Hong Kong's domestic exports declined, while re-exports grew rapidly. This is not due to any change in reporting practices, but simply reflects the progress of economic reform in China, which led to a movement of Hong Kong manufacturing to the Mainland and allowed Hong Kong to re-establish its pre-World War II role as a conduit for trade to and from China. As Figure IV shows, while there has been extraordinary growth in the amount of trade originating in or destined for China, the amount of non-China related re-export trade has remained constant at about 10% of GDP, which supports the notion that there have been no strong trends in reporting practices.

Turning to the United States, the Bureau of the Census' data on waterborne commerce, based on shipper declarations, provides fairly unique information as it records the origin and last port of lading of imports and the destination and first port of unlading of exports. As such, it provides information on the routing of goods movements as seen from the perspective of their originating or terminal point. The definitions used by the Census Bureau are similar in spirit to those used by Hong Kong. Thus, the country of origin of imports is defined as:

Table IV: International Commerce of the United States (millions of dollars, Customs valuations)				
	Imports		Exports	
	Total	Waterborne	Total	Waterborne
1990	495980	283413	392924	150739
1991	488452	272286	421764	162354
1992	532663	293099	448161	170313
1993	580658	310281	465090	166689
1994	663256	338809	512626	177333
1995	743543	356004	584742	216006
1996	795289	373932	625075	220024
1997	870671	403656	689182	222026
Note: Totals drawn from Survey of Current Business, July 1998, Table 2.				

> "…the country in which the product was mined, grown or manufactured. Further labor, work or material added to an article in another foreign country…must effect a substantial transformation in order to render such other country the "country of origin." Such substantial transformations include the smelting of ores, refining of crude products, and the like. The country of origin is not changed when the merchandise is subjected in another country merely to minor manipulations, such as sorting, grading and the like."

Regarding exports, the country of destination:

> "means the country in which the goods are to be consumed or further processed or manufactured. The country to which the goods are being shipped is not the country of ultimate destination for purposes of preparing the Shipper's Export Declaration if the exporter has knowledge at the time the goods leave the United States that they are intended for reexport or transshipment in their present form to another known country."[19]

The Census import files also contain information on transport charges, the only such data on both goods routing and costs that I have been able to find. As Table IV shows, waterborne commerce accounts for between one-third and one-half of the value of U.S. trade.

One of the surprising aspects of the data, highlighted in the Introduction, is the tendency for Hong Kong's re-exports to roundtrip. Table V below summarizes the average annual

[19]These definitions are drawn from the regulations published at the Bureau's website www.census.gov/foreign-trade/www/regulations/regulations.html.

Table V: Average Annual Roundtrip Shares (%)			
	Time Period	(1) By Value	(2) By Weight
Hong Kong Re-exports	1984-96	5.1	4.5
Dutch Transits	1982-92	NA	0.5
Notes: Calculated exclusive of unknown and nec origins and destinations. Hong Kong re-exports by weight calculated using products measured in kilograms or tonnes only, with kilograms converted to tonnes. The average value roundtrip share for the same products is 7.3 percent.			

roundtrip share of Hong Kong's re-exports and compares it with the amount of roundtripping found in the Dutch transit data, the most detailed and carefully collected data set on transits I have encountered. Roundtripping occurs in both samples, but is more pronounced in the Hong Kong data. Since the Dutch transit data are measured in tonnes, while the Hong Kong data are measured in values and diverse units, the two series are not precisely comparable. Nevertheless, when I restrict the comparison to Hong Kong goods measured in kilograms or tonnes (column 2), the same pattern emerges.[20] Dutch transits, while they may be stored and warehoused in the Netherlands for extensive periods of time, are kept under customs supervision. Thus, it is possible that the difference between the two data sets reflects the greater opportunity to process the Hong Kong goods (which circulate freely), which might suggest that roundtripping is more characteristic of processing than transport or information. However, as noted below, the degree with which statistical definitions are enforced, in practice, is questionable. Consequently, one cannot, safely, come to nuanced conclusions based upon differences in reported statistical practices. What is clear is that the tendency for Hong Kong re-exports to roundtrip is unusually high.

[20] As I show in the appendix on transits and quantities, this tendency for Hong Kong re-exports to roundtrip "too much" " persists even when one controls for variables such as distance and the direct trade flows with trading partners. In my other data sets on transits, i.e. for Hong Kong and the United States, I find annual roundtrip shares of about 1/20th of one percent of the total tonnage. However, there are problems with the coverage, coding, and accuracy of these data, as is explained in the appendix (under preparation).

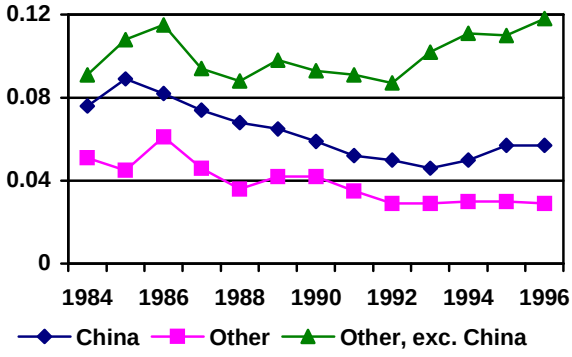
Table VI: Average Annual Roundtrip Shares (products with 13 years of data)			
Avg. RT share	SITC3 Code	Description	Share of Rex (%)
0.76	79199	Parts of the railway or tramway locomotives or rolling stock of items from 79111 or 79182 (locomotives and cars).	0.00
0.73	97103	Waste and scrap of gold.	0.01
0.72	65196 65199	Flax yarn, paper yarn and yarn of other (non-jute) vegetable materials.	0.55
0.45	71280	Parts for the turbines of items from 71211 to 71219 (steam turbines).	0.00
0.41	66729	Diamonds (cut, not mounted or set*)	1.02
0.41	65117	Yarn of carded wool, containing less than 85% by weight of wool, not for retail sale.	0.17
0.40	52493	Calcium carbide.	0.00
0.38	71491, 71499 71899	Parts for turbo jets or turbo-propellers, parts for gas turbines, parts for linear acting hydraulic or pneumatic power engines & motors (cylinders).	0.02
0.38	65441 65442	Fabrics, woven of flax.	0.09
0.37	74171	Producer gas or water gas generators, acetylene gas generators and similar water process gas generators.	0.00
Notes: Average roundtrip and re-export shares are calculated exclusive of unknown or nec origins and destinations and, to broaden the product categories covered, using value data. (*) The SITC2 description.			

Table VI above presents the ten Hong Kong "harmonized" product groups with the highest average annual roundtrip shares. A variety of product types, from precious metals and stones to semi-processed raw materials to specialized industrial parts, all have high roundtrip ratios.[21] Of the 1414 "harmonized" product categories with re-exports in all 13 of the years 1984-1996, fully 415 have an average roundtrip share in excess of 5%. Clearly, roundtripping in the Hong Kong data is general and is not driven by particular products, or even particular product types. Figure V provides time series data on the average roundtrip share of Hong Kong

[21]The unusually large amount of return re-exports to Israel, noted in the Introduction, comes from trade in diamonds, an average of 74% of the value of which was returned to Israel.

re-exports originating in China and re-exports originating elsewhere. As the reader can see, both roundtrip shares have fallen over time. This trend is due to the rapid growth of re-export trade funneled through Hong Kong en route to or from China (Figure IV earlier). If one removes China as an origin or destination, one finds that the propensity to roundtrip of non-China related trade has remained around 10% (Figure V). Thus, while the total roundtrip share of re-exports originating in the United States fell steadily from 10.2% in 1984 to 4.9% in 1996, the roundtrip share excluding re-exports destined for China has fluctuated around 15% (the number cited in the Introduction), exceeding 18% in each year of 1994-1996. In sum, roundtripping is a widespread, persistent, and long standing phenomena.

Figure V: Hong Kong Re-export Roundtrip Shares by Origin



Finally, before proceeding with the analysis, it is useful to review the accuracy of the underlying data. Consider, for example, the data on Hong Kong re-exports. Since Hong Kong does not maintain trade barriers, all imports are released into general circulation without bond. Consequently, re-exports are not separated out in the import data and the data on re-exports, including the purported origin, are based purely upon exporter declarations. This leads to irreconcilable discrepancies between the import and re-export data. If one sums the total re-exports by "harmonized" product category in the years 1984-1996, one finds that there are 1316 product categories with quantity data in which there were positive amounts of re-exports.[22] Of these categories, there are 7 with no recorded imports, whatsoever, in the years 1984-1996 (the

[22]There are additional categories with only value measures, but I do not use them in the comparison which follows because of the uncertainty concerning the markup over the value of imports.

average cumulative re-export value is HK$ 8.7 million). In total, there are 188 categories in which the cumulative quantity of re-exports exceeds the cumulative quantity of imports. Some of these deviations are quite substantial, as show in Figure VI, which graphs the cumulative re-export and import quantities for products in which both data sets register positive flows. Since re-exporters declare the product origin, one can also compare the origin x product declarations with the cumulative origin x product imports. Of the 30225 origin x product combinations with unit measures and positive re-exports in the period 1984-1996 (excluding n.e.c. origins), fully 6328 register no imports during the period 1984-1996 (with an average cumulative re-export value of HK$ 1.1 million). In total, in 10977 categories the cumulative quantity of re-exports exceeds the cumulative quantity of imports. As Figure VII indicates, the deviations are extraordinary.

Figure VI: Hong Kong Re-exports & Imports, by Product
(cumulative quantities, 1984-1996)

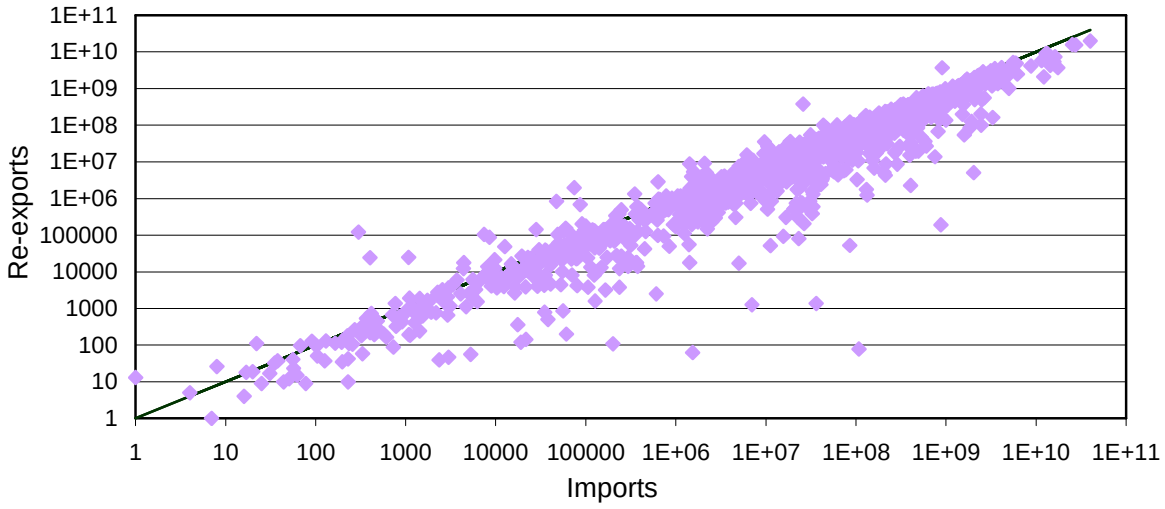
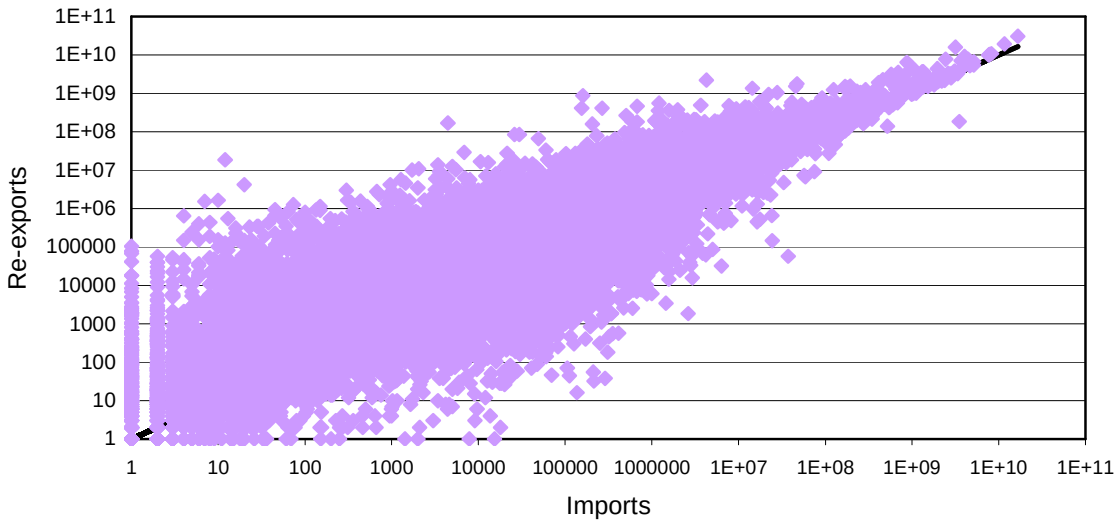


Figure VII: Hong Kong Re-exports & Imports, by Origin x Product
(cumulative quantities, 1984-1996)



The deviations between Hong Kong's re-export and import data noted above arise, no doubt, from a combination of inadvertent error and deliberate misrepresentation. Exporter and importer knowledge concerning true origin and correct product classification is less than perfect and many products listed as re-exports are probably more appropriately classified as the domestic produce of Hong Kong.[23] This fact, however, is of little relevance to the analysis below. Despite the extraordinary inconsistencies between the import and re-export files, they generate strong and robust correlations on dimensions of interest. Further, whatever the degree of disguised exports in Hong Kong's re-export data, it cannot be a dominant factor in explaining the results, as the apparent value added generated by the re-export activity dwarfs the total value added of Hong Kong's manufacturing sector. The Figures shown above merely serve as a reality check, a caution in taking too seriously statistical declarations concerning the meaning of "re-export" or "transit" statistics. Similar inconsistencies can be found in the data of other economies.[24]

[23]I have repeatedly queried the Hong Kong authorities whether their Rules of Origin allow for cases where a product is transformed enough to change product SITC category, without acquiring Hong Kong origin, but have never received an informative answer.

[24]To give one of the simpler examples, according to Dutch statistics all re-exports are "warehoused under bond…a form of storage under constant customs supervision." (Statistics Netherlands, "Import, Export and Transit Statistics"). Re-exports, once in the Netherlands, can be reclassified as imports, pay the appropriate tariff, and be released into circulation in the Netherlands. As a result, the annual outgoing re-export tonnage is about 80% of the incoming. Nevertheless, despite the overall shortfall, and all the bondage and supervision, of the 166 product types with outgoing shipments in the years 1982-1992, 4 have no incoming shipments whatsoever, while in the case of an additional 22 products the outgoing shipments exceed the cumulative incoming shipments for the years 1982-1992. Dutch statistical authorities assured me, however, that it is impossible for a re-export to be classified as an outgoing shipment, emerging from a bonded warehouse, without first being declared as an incoming bonded re-export.

I should note that in the Dutch data the origin of re-exports is recorded when they enter the warehouses, and their destination is recorded when they leave, but no attempt is made to record both the origin and the destination. Consequently, the data provide no information on routing. I contacted some of the major warehouses to see if they could provide information on origin by destination, but they were not helpful.

III. Basic Pricing Relations

Table VII below provides an analysis of the pricing (i.e. unit values) of Hong Kong's re-exports. Column (1) presents the baseline specification. The dependent variable is the ln average unit re-export value of product "p" originating in country "o" destined for country "d" in year "y". The regressors include (a) the ln average unit value of the imports of the same product, in the same year, from the country of origin and, similarly, the ln average unit value of the exports of the same product, in the same year, to the country of destination; (b) the "excess distance" of the routing through Hong Kong, i.e. the total route distance from the origin through Hong Kong to the destination, minus the direct distance from the origin to the destination; (c) the share of roundtrip shipments in the total quantity of re-exports of product p from country o in that year; (d) squared terms for both excess distance and the roundtrip share; (e) a dummy indicating that the origin equals the destination (i.e a roundtrip); and (f) dummies for both years and products.

As the Table shows, the prices of re-exports are highly correlated with the prices of corresponding imports and exports. This has a very natural interpretation in terms of the "transport" view of the world put forth in the Introduction. Since products are differentiated, even within detailed product categories, the import price measures the overall characteristics of goods produced in a particular origin, while the export price proxies for the type of goods demanded at each destination, and the combination of the two prices captures the characteristics of goods moving, for purely transport reasons, from an origin to a destination. This view is supported in a more detailed examination of the data.[25] It cannot, however, be the whole story.

[25]For example, a dummy for China as a destination is slightly negative (-.02) with the export price in the regression, and much more so (-.08) when the export price is removed. The obvious interpretation is that goods destined for China from all import sources are of poorer quality, and hence cheaper, than the average import and the coefficient on the price of Hong Kong exports to China adjusts for this.

As shown in the analysis of U.S. trade, further below, even when one controls for the price characteristics of the goods moving *directly* from origins to destinations, goods moving indirectly through hubs acquire the price characteristics of the hub. Thus, one needs to find alternative explanations. In terms of the "processing" view of the world, a re-export is an imported good that has been transformed to look somewhat, but not completely, like a domestic product, which will yield positive correlations with both the price of imports and the price of the hub's domestic output. In terms of "information," the wholesale/retail price should be related to costs (the import price) and the prices typically charged to the market segment served by the hub's matchmakers (the export price).

The baseline specification also includes measures designed to signal value added. The more "perverse" the route through Hong Kong, i.e. the greater the excess distance, the greater the final sales price of the products.[26] The interpretation, in terms of processing and information, would be that products are only shipped along a perverse route, presumably at greater cost, if there is significant value added in the Hong Kong stop of the operation. In terms of transport, one might argue that the excess distance proxies for distance, which, due to transport costs, selects higher value products. However, when one decomposes the excess distance into the total route distance and the direct shipping distance, as in column (2), one finds that the greater the direct distance the lower the price. This result is hard to justify as a "Washington Apples" effect,

[26]I introduce squared terms for the distance and roundtripping measures in this and other tables to allow the relation to be less (or more) than exponential. Below each quadratic I list the % of observations that lie before the max/min of the function. In parentheses, I provide a summary of the overall sign of the relation, based upon the criterion: what is the sign of the derivative of the quadratic for 70% or more of the observations? For most of the results in this section, the basic sign of the relation follows the sign of the linear term in the quadratic. This is not the case, however, in Section IV.

Table VII: Pricing of Hong Kong Re-exports Dependent variable – Ln unit Re-export value								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Baseline	Segments	No P's	Pm only	Ch Dum.	ChinaO	Markup	Markup
LnPm	.715* (257.4)	.707* (252.9)		.726* (348.6)	.644* (196.4)	.448* (35.9)		
LnPx	.152* (50.4)	.151* (50.4)			.155* (52.2)	.198* (43.3)		
LnPx/Pm							.254* (105.9)	
ED	.175* (17.1)		.568* (73.2)	.193* (27.7)	.162* (15.9)	.213* (2.9)	.114* (11.2)	.055* (7.6)
ED^2	-.021* (6.5)		-.072* (28.8)	-.027* (12.0)	-.024* (7.6)	.001 (0.0)	-.017* (5.3)	-.010* (4.3)
% f′=0	100% (+)		99% (+)	99% (+)	99% (+)	100% (+)	99% (+)	98% (+)
Route		.269* (17.4)						
Route^2		-.036* (10.0)						
% f′=0		99% (+)						
Direct		-.018 (1.1)						
Direct^2		-.029* (6.4)						
% f′=0		100% (-)						
RTQop	.401* (11.0)	.442* (12.1)	-.372* (12.4)	.417* (15.8)	.928* (24.3)	.427* (4.8)	.783* (20.5)	.672* (23.3)
RTQop^2	-.255* (5.1)	-.296* (6.0)	.606* (15.6)	-.287* (8.2)	-.745* (14.8)	-.340* (3.8)	-.627* (12.3)	-.585* (15.6)
% f′=0	98% (+)	98% (+)	93% (-)	98% (+)	97% (+)	96% (+)	97% (+)	97% (+)
Orig=Dest	-.145* (14.9)	-.043* (3.8)	-.272* (33.9)	-.133* (17.9)	-.119* (12.3)	-.117* (8.9)	-.092* (9.4)	-.081* (10.4)
ChinaO					-.398* (70.9)		-.268* (54.8)	.021* (6.6)
Products	847	847	1287	1287	847	802	847	1287
Dummies	Y,P	Y,P	Y,P	Y,P	Y,P	Y,P	Y,P	Y,P
R^2	.8340	.8344	.7934	.8553	.8365	.8768	.1743	.1165
N	378091	378091	720575	720575	378091	97338	378091	720575

Notes: (*) Significant at the 1% level, using the White (1980) heteroskedastic consistent standard errors (t-statistics in parentheses). % f′=0 - % of observations appearing before the Max/Min of the quadratic function, with the sign in parentheses denoting the sample-wide dominant effect. Products – the total number of separate "products", as specified by the product dummies. The same notation is used in later tables.

but fits the other hypotheses as, controlling for distance, an increase in the direct distance implies a reduction in the excess distance (i.e. a less perverse route).

I introduce roundtripping, which, from the point of view of pure transport considerations, represents the most egregiously perverse routing possible, into the baseline specification as a further signal of product movements which are related to value added considerations, rather than transport. As column (1) shows, products from a particular origin which roundtrip a great deal in a given year have higher prices when sent on to any destination, independent of its distance characteristics. The Table also introduces a dummy for products returning to their point of origin. Conditional on the fact that excess distance and roundtripping, in general, raises their prices, the unit value of these shipments tends to be low. Although one should not make too much of this coefficient, as its sign is contingent on the magnitude of the other controls, it is supportive of an information view of the world. If goods are sorted in Hong Kong to match the needs of customers, those products that are returned to the point of origin might constitute "rejects", i.e. inferior segments of the product group.[27] Alternatively, sales into the market of origin, where information on potential sources of supply is more readily available, would command lower markups.

Columns (2)-(4) of Table VII introduce some sensitivity tests. First, as has already been discussed, column (2) breaks the excess distance down into its two components, showing that while the total route distance raises prices, the direct distance lowers them. Second, column (3) shows the important role played by the controls for import and export prices. Absent these controls, the coefficient on roundtripping is reversed in sign, reflecting the fact that products

[27]Sorting can be a manufacturing/processing activity, as in pea factories, where workers scan conveyer belts for bad peas. If workers in Hong Kong are sorting products for foreign producers, however, it is hard to understand why the "bad peas" are, especially, sent back to the market of origin. This result seems more compatible with returns or rejects from a wholesale/retail operation.

from China have higher roundtrip ratios (see Figure V earlier) and tend to have lower prices. Controlling for import prices, column (4), returns the coefficient to its original sign.[28] While some of the results in this Table, and those which follow, can be reversed if one fails to control for import or export prices, these controls seem natural for a regression determining the price of goods moving through indirect routings, and I impose them in subsequent specifications.[29]

As noted in the Introduction, by the early 1990s the total value of Hong Kong re-exports originating in the People's Republic of China exceeded the value of imports, for domestic and re-export purposes, from that source. In order to test whether this fact is driven by false, transfer pricing induced, margins, in column (5) of Table VII I introduce a dummy for China as an origin. As the Table shows, products originating in China actually command substantially lower prices. One might be concerned that this might be a correction for the fact that the other variables which raise prices, e.g. excess distance and roundtripping, actually have no influence on goods with China origin.[30] Column (6) runs the baseline regression on goods which originate in China,

[28]Actually, merely inserting a dummy for China as origin is enough to reverse the sign.

[29]The reader will notice that the sample in columns (3) and (4) is substantially greater than that in the other columns. The sample size is reduced when one merges the re-export files with the import and export files as there are many re-export products for which Hong Kong has no domestic exports to the market of destination. The sample presented in columns (3) and (4) is arrived at by merging the re-export files with the import files. There are actually somewhat more observations (756144, excluding unknowns) in the re-export files themselves, but I use the result of the re-export/import merge in the Table to illustrate the impact of controlling for import prices alone.

[30]For instance, one might be concerned that I have mis-specified the excess distance associated with transhipment through Hong Kong. As explained in the Appendix, I use the location of a country's principal city as the coordinates for the computation of distances. In the case of China, this is Shanghai. Many readers might question this choice over an alternative in Southern China, such as Guangzhou. The data provided to me by the Hong Kong authorities indicate that much of the inbound Chinese cargo originates north of Shanghai. For example, in 1991 380447 of the 602730 seaborne inbound transhipment tonnes originating in China came from Shanghai, Tianjin, Qinqdao and Dalian (the latter three are all several hundred miles north of Shanghai). Similarly, Shanghai, Qinhuangdao and Dalian together accounted for 635,311 of the 1,099,564 inbound seaborne tonnes (imports). The data on outbound seaborne shipments provide less detail, but even here one finds that in 1988 Shanghai and Tianjin alone accounted for about half of outbound transhipments and a quarter of outbound exports. While river and railway trade is limited to Southern China, the tonnages are small relative to seaborne cargo. Finally, I should note that much of the goods exported through Southern China, e.g. Shenzhen, do not originate there, but are transhipped from other regions (see Far Eastern Economic Review, "Into the red zone", "The envy of China", and "Beggar thy neighbour"). For these reasons, I do not depart from my practice of using the principal city, and use Shanghai to represent China.

alone. The patterns and magnitudes of the coefficients on excess distance, roundtripping, and even the export price, are all similar to those present in the aggregate sample (column 1). Alternatively, one might be concerned that the controls for import and export prices, by allowing the coefficients to sum to less than one, do not fully control for the low prices of China related trade. Generally, I do not run the regressions as a markup since this is quite a mis-specification if there is product differentiation and a sorting of origin specific products across export markets, as well as between direct and indirect routes.[31] Nevertheless, as column (7) shows, when the pricing equation is run as a markup, the results are similar. Much of the negative dummy in column (7) derives from the fact that Chinese import prices tend to be low, while their market destination prices are high. This "wedge", which could be attributed to the processing or informational value added of Hong Kong entrepreneurs, [32] could also be taken as evidence of the underpricing of Chinese exports to Hong Kong. Consequently, in column (8) I eliminate export prices from the analysis, which also allows me to expand the sample. At this point one finally arrives at a positive, but small, dummy associated with trade originating in China.[33]

I should emphasize that the preceeding results should not be interpreted as indicating that the "markups" associated with re-export trade originating in China are unusually low. The average ln markup of goods originating in China in the data underlying the results of column (7), where the China origin dummy is strongly negative, is .412, which is greater than the average ln

[31]In the case of Hong Kong, when the export price is lower than the import price, the markup equation may imply a large negative "markup", which is difficult to interpret. Similarly, for the U.S. regressions governing indirect shipments, a markup specification completely ignores the sorting of products between indirect and direct routes. When one runs the equation as a markup one denies the possibility that any of the price movements are driven by transport, i.e. non-product value added, considerations.

[32]If one runs the specification in column (7) on China origin products alone, one finds that the markup on these products moves 23% with the difference between the export and import prices, i.e. about the same as the response of the aggregate sample.

[33]Since column (8) does not require a merge with the export data files, the sample expands. If one runs the specification of column (8) on the sample of column (7), one gets a dummy of .041.

markup of .341 associated with goods originating elsewhere. The connections Hong Kong entrepreneurs have with the Chinese market allows them to earn substantial incomes in managing trade from that source. However, these ties, and the incomes they afford, can be summarized by factors such as the excess distance of the routing, the propensity to roundtrip and, perhaps, the substantial difference between the prices of the import and export markets. Contingent on these effects, China related Hong Kong trade actually commands less than normal, or at best normal, markups, reflecting another aspect of Hong Kong's relationship with China, i.e. its natural role as a Chinese port, which leads to a large number of shipments generated by pure transport considerations. Regardless, whether one accepts this interpretation or not, it is clear that the data do not afford any basis for believing that the price increases associated with the movement of Chinese goods through Hong Kong are unusually high. No amount of sorting can explain why the total value of re-exports originating in China exceeds the value of imports from that source by 20%. Absent evidence of artificially inflated transfer prices, one is then driven to a value added interpretation of the data.

Table VIII below presents an analysis of the pricing of the indirect imports and exports of the United States. In computing distances for the United States, I pick Chicago as the weighted average origin and destination of shipments associated with the U.S. economy. This hardly seems compelling, but, given the physical size of the United States, neither does any other single location. Fortunately, the waterborne trade files provide information on the coastal district in which the trade arrived or departed. Using these data, I treat the United States as being made up of the following six regions/coastal districts and their corresponding principal cities: (1) North Atlantic (New York); (2) South Atlantic (Jacksonville); (3) Gulf (Houston); (4) South Pacific (Los Angeles); (5) North Pacific (Seattle); and (6) Great Lakes (Chicago). In the Table below I

present both sets of results, although those based upon the six regions would seem to be more sensible. The "prices" used in the analysis are arrived at by dividing the total value of shipments by their weight.

In Table VIII I regress the ln price of an indirect import (i.e. one whose final lading took place somewhere other than in the country of origin) on the ln prices of direct shipments from both the country of origin and the hub to the United States (or the region of the United States, as appropriate). As the Table shows, although the prices of indirect imports are highly correlated with the prices of direct shipments from the origin, they are also correlated with the prices of direct shipments from the hub. Similar results hold for indirect exports (whose first projected unlading is in a country other than the country of final destination). As noted above, these results are hard to motivate with a "transport" explanation, and seem more compatible with product value added at the hub locations.

As in the case of the Hong Kong pricing regressions, Table VIII also introduces the excess distance of the route of indirect shipments. Excess distance tends to increase the prices of incoming indirect shipments, but lowers the prices of outgoing indirect shipments. The more perverse the route a good has *passed through*, the greater should be the compensating price increase, i.e. value added, associated with having taken that route. This explains the results in the import data. Regarding the export data, the more perverse the route a good *embarks on*, the greater should be the potential price increase, i.e. value added, derivable from that route. In terms of processing, outgoing shipments following perverse routes should be relatively unfinished, to allow for the opportunity of processing at the hub. In terms of information, indirect shipments to a "wholesaler" should command lower prices than "retail" shipments, representing the markup a wholesaler derives from his information about prospective customers.

Table VIII: Pricing of U.S. Indirect Waterborne Trade
Dependent variable – Ln value to weight ratio

	Indirect Imports							Indirect Exports					
	(1)	(2)	(3)	(4)	(5)	(6)		(7)	(8)	(9)	(10)	(11)	(12)
	United States	United States	Six Regions	Six Regions	Six Regions	Six Regions		United States	United States	Six Regions	Six Regions	Six Regions	Six Regions
LnPo	.500* (184.1)	.481* (172.4)	.474* (190.2)	.459* (180.1)	.392* (138.9)	.391* (138.8)	**LnPd**	.239* (77.8)	.238* (77.3)	.250* (78.7)	.249* (78.3)	.243* (76.0)	.242* (75.8)
LnPh	.135* (62.2)	.129* (59.5)	.150* (74.0)	.144* (70.8)	.117* (52.8)	.117* (52.7)	**LnPh**	.119* (37.7)	.117* (37.1)	.144* (46.4)	.144* (46.4)	.141* (45.3)	.140* (45.1)
ED	.061* (10.8)		.111* (18.7)		.167* (19.6)		**ED**	-.022* (3.4)		-.053* (6.9)		-.064* (5.4)	
ED2	-.004 (1.9)		-.022* (8.7)		-.029* (9.1)		**ED2**	.012* (4.8)		.020* (6.7)		.013* (3.2)	
% f′=0	100% (+)		99% (+)		99% (+)		% f′=0	90% (-)		96% (-)		99% (-)	
Route		.083* (6.0)		.072* (4.7)		.243* (13.0)	**Route**		-.017 (1.2)		-.034 (2.3)		-.088* (3.9)
Route^2		-.009* (3.3)		-.005 (1.5)		-.029* (7.8)	**Route^2**		.005 (1.9)		.006 (1.8)		.014* (3.0)
% f′=0		99% (+)		100% (+)		100% (+)	% f′=0		44% (=)		96% (-)		97% (-)
Direct		-.170* (7.7)		.033 (1.6)		-.255* (6.6)	**Direct**		.104* (5.5)		.057* (3.0)		-.358* (6.8)
Direct^2		-.005 (0.8)		-.070* (12.2)		.020 (1.8)	**Direct^2**		-.030* (5.3)		-.036* (6.4)		.066* (4.4)
% f′=0		100% (-)		0% (-)		100% (-)	% f′=0		61% (=)		11% (-)		100% (-)
Products	4437	4437	4205	4205	4205	4205	Products	4300	4300	4047	4047	4047	4047
Dummies	Y,P	Y,P	Y,P,Cd	Y,P,Cd	Y,P,Cd O,H	Y,P,Cd O,H	Dummies	Y,P	Y,P	Y,P,Cd	Y,P,Cd	Y,P,Cd D,H	Y,P,Cd D,H
R^2	.6347	.6365	.6306	.6320	.6435	.6435	R^2	.6114	.6114	.6343	.6346	.6382	.6384
N	410235	410235	457119	457119	457119	457119	N	371929	371929	327706	327706	327706	327706

Notes: Cd = coastal district; H = hub, i.e. the country of last lading or first unlading, which does not equal the origin or destination.

As was noted in the Introduction, indirect exports, like indirect imports, are, on average, more valuable than their corresponding direct shipments. This fact is suggestive of a selection effect which, generally, pulls more valuable goods onto indirect routes. Conditional upon this mean, value increasing, effect, however, the opposite signs of excess distance in the incoming and outgoing regressions are suggestive of a value added motivation for undertaking more perverse routes.

As a sensitivity test, Table VIII also breaks the excess distance into its components, the total route distance and the direct shipping distance. For imports, the total (indirect) route distance raises the price of the goods, while the direct distance lowers their prices, in a manner similar to the Hong Kong data.[34] For exports, the data are less supportive. In the national level regression, both the route distance and the direct shipping distance are not monotonically associated with prices. In the regional level regression, which, presumably, has better measures of distance, the total route distance is negatively associated with prices, but so is the direct distance. Since an increase in the direct distance, holding constant the total route distance, implies a reduction of excess distance, one would have expected, for consistency with the other results, a positive relation. Part of this is due to a bias introduced by selection effects. As shown in the next section, once one controls more fully for origin prices the influence of the direct distance becomes, if not positive, at least neutral. Finally, I should note that I take advantage of the regional specification to introduce origin and destination dummies in columns (5)-(6) and (11)-(12).[35] These do not have a significant effect on the results.

[34]In column (4), despite the positive sign of the linear term, the dominant effect of Direct is negative. Only 641 of the 457,119 observations have values less than the maximum of the estimated quadratic function.

[35]Because of the six regions, there is still independent variation in the direct distances, even with these dummies, which is not the case for the national level regressions. Combinations of origin/destination/hub dummies eliminate some of the legs (route or direct) of the Hong Kong and U.S. national level regressions and limit the

IV. Selection Effects

In this section I move away from general correlations to a more focused consideration of the alternative hypothesis that the price movements observed in this paper are driven by selection effects. Table VII above noted the importance of controlling for the prices of direct trade in evaluating the effect of circuitous transport on the pricing of goods. Similar controls must be applied in the evaluation of selection effects. According to the Alchian-Allen conjecture, higher fixed transport charges will select in favour of higher quality goods. This is a statement, fundamentally, about selection with respect to goods emanating from particular origins. Thus, the price of goods originating in Canada will rise with distance, as will those of goods originating in Algeria. The Alchian-Allen hypothesis does not imply, however, that Algerian goods delivered to the United States will be more expensive than Canadian goods sent to the same destination, as the mean value and quality of Canadian goods is likely to be higher than those produced in Algeria. To evaluate the role of selection effects in driving price movements, one needs to de-mean each data series with respect to a complete set of origin cross product dummies.

In Table IX below I run the unit values of each data set on a full set of year cross origin cross product dummies, and measures of the route distance travelled. Relative to the regressions of the previous section, these regressions limit the variation used to identify effects, as there are an extraordinary number of dummies, but also increase the sample size, as it is no longer necessary to get matches between records in the import, export and indirect trade files. As the presence of origin effects eliminates all of the distance variation when the U.S. import data are analyzed at the national level, I focus the U.S. analysis on the coastal-district (regional) level,

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variation around which the excess distance effects are identified. While the signs of the coefficients (on excess distance) have survived the combinations I have tried, it is doubtful whether they can survive them all.

Table IX: The Effect of Distance on Unit Values Dependent variable – Ln value to weight ratio or unit value									
	United States						Hong Kong		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Direct Imports	Direct Exports	Indirect Imports	Indirect Imports	Indirect Exports	Indirect Exports	Exports	Re-exports	Re-exports
Dist	.228* (16.1)	.380* (75.7)	-.038* (4.7)		-.012 (1.9)		.010 (0.8)	.062* (11.1)	
Dist^2	-.099* (23.6)	-.124* (67.6)	.008* (5.1)		-.004* (2.7)		-.013* (3.3)	-.017* (11.4)	
% f′=0	29% (-)	66% (=)	77% (-)		100% (-)		18% (-)	63% (=)	
Direct				.067* (3.8)		.219* (21.5)			.075* (13.3)
Direct^2				-.048* (8.9)		-.090* (25.9)			-.029* (15.1)
% f′=0				3% (-)		41% (=)			45% (=)
Dominant Effect	**Negative**	**Neutral**	**Negative**	**Negative**	**Negative**	**Neutral**	**Negative**	**Neutral**	**Neutral**
Products	435727	174177	314617	314617	113553	113553	8801	168187	168187
Dummies	Y⊗O⊗P	Y⊗Cd⊗P	Y⊗O⊗P	Y⊗O⊗P	Y⊗Cd⊗P	Y⊗Cd⊗P	Y⊗P	Y⊗O⊗P	Y⊗O⊗P
Rbar^2	.8081	.6300	.7190	.7191	.6144	.6148	.8625	.8883	.8883
N	881905	1760805	988700	988700	684186	684186	151652	756144	756144
Notes: X⊗Y – the Kronecker product of the observation specific X dummy with the Y dummy, i.e. separate dummies for each X and Y combination. Products – the total number of separate "products", as specified by the ⊗P dummies. A similar notation applies in Table XI.									

using the variation in the distance to each coastal district as a means of identifying the effect of distance on prices.

As Table IX shows, there is no evidence in favour of a positive effect of distance on unit values. For U.S. direct imports (column 1) and Hong Kong exports (column 7), although unit values rise initially with distance, the quadratic functions peak early in the sample, and the dominant effect, for most of the observations, is negative. In the case of U.S. direct exports (column 2), the value to weight ratio first rises and then falls with distance, generating an inverted U which peaks around the middle of the sample. In the case of U.S. indirect imports and exports (columns 3 and 5), the dominant effect of distance (as measured by the total route length) is negative. As an alternative, I project the value to weight ratios of these shipments

against the direct route distance (columns 4 and 6), but find no positive effect. Finally, for Hong Kong, re-export values rise and then fall with distance, whether measured by the total route length or the direct shipment distance, generating an inverted U which peaks around the middle of the sample. In sum, controlling for the average prices at points of origin, unit values rise with small distances but, over the full range of the samples, the dominant effect is neutral or negative. Clearly, the data provide no support for the Alchian-Allen conjecture of a positive relation between transport costs and unit values, and, if anything, are more suggestive of freight absorption by imperfectly competitive sellers.

As a contrast, Table X below reproduces the results of the preceeding section using the same full set of year cross origin cross product dummies. As before, the excess distance of a routing increases the unit values of both U.S. indirect imports and Hong Kong re-exports, while lowering the unit value of U.S. indirect exports (outgoing indirect shipments). Although, as shown in Table IX above, the *unconditional* effect of distance is to lower the unit value of U.S. indirect imports, a rise in the total route distance travelled *conditional* on the direct distance (i.e. an increase in the excess distance), raises the unit value (column 2, Table X). Similarly, for Hong Kong re-exports, although neither the direct nor the total route distance have consistent effects on their own (Table IX), when one is conditioned on the other, the total route distance raises unit values while the direct route distance lowers them, which is consistent with the product value added explanations advanced earlier. For U.S. indirect exports the results provide little contrast, as, in both the unconditional (Table IX) and conditional (Table X) regressions the total route distance of outgoing indirect trade lowers unit values, while the direct distance has no monotonic effect.

Table X: Excess Distance and the Pricing of Goods Dependent variable – Ln value to weight ratio or unit value						
	United States				Hong Kong	
	(1)	(2)	(3)	(4)	(5)	(6)
	Indirect Imports	Indirect Imports	Indirect Exports	Indirect Exports	Re-exports	Re-exports
ED	.045* (9.9)		-.077* (14.1)		.055* (8.3)	
ED^2	-.012* (7.4)		.023* (11.5)		-.015* (7.1)	
% f′=0	97% (+)		97% (-)		95% (+)	
Dist		.032* (3.0)		-.067* (6.8)		.107* (10.2)
Dist^2		-.003 (1.6)		.011* (5.3)		-.023* (9.5)
% f′=0		100% (+)		96% (-)		83% (+)
Direct		.027 (1.3)		.270* (20.5)		-.004 (0.4)
Direct^2		-.042* (7.3)		-.097* (24.7)		-.013* (4.5)
% f′=0		1% (-)		51% (=)		100% (-)
O=D					-.041* (5.9)	-.034* (4.3)
Products	314617	314617	113553	113553	168187	168187
Dummies	Y⊗O⊗P	Y⊗O⊗P	Y⊗Cd⊗P	Y⊗Cd⊗P	Y⊗O⊗P	Y⊗O⊗P
Rbar^2	.7190	.7191	.6144	.6148	.8883	.8883
N	988700	988700	684186	684186	756144	756144

One can extend the preceeding analysis using the data on transport charges in the U.S. import files and a simple structural model of the interrelation between unit values, transport charges, and distance. Unit values depend upon unit transport charges and year cross origin cross product effects (controlling for the types of goods produced at each location). Transport charges rise with distance, and are also influenced by unit values (because of insurance, packing and handling costs) and year cross origin cross product effects (origin specific port charges crossed with product specific handling costs). Formally:

(1) $\ln(\text{value/weight}) = \beta_1 \ln(\text{charges/weight}) + Y \otimes O \otimes P \text{ Dummies}$

(2) $\ln(\text{charges/weight}) = \alpha_1 \ln(\text{value/weight}) + f(\text{Dist}) + Y \otimes O \otimes P \text{ Dummies}$

Transport costs instrumented with distance measures then allow one to identify the coefficient β_1. The identification fails, of course, if distance affects unit values directly. The only conceivable way in which this might matter is through time. However, time, and its associated inventory carrying cost, is a proportional charge on both poor and high quality goods and, as such, does not affect their relative prices. In the world of the Alchian-Allen conjecture, with its restrictions on income effects and cross price elasticities, there should be no effect on the composition of demand or goods shipments.[36]

Table XI presents the analysis. Column (1) shows that the value to weight ratio of U.S. direct imports rises with the charges per tonne, while column (2) shows that these charges are positively related to distance. Charges, instrumented with distance, however, have a negative effect on unit values (column 3), suggesting that all of the positive coefficient in column (1) is due to the endogenous response of charges to unit values.[37] In columns (4) – (6) I rerun the analysis using indirect shipments, and get much the same results.[38]

The Alchian-Allen conjecture is essential to any "transport" based explanation of the price changes associated with goods movements through hubs. It provides a partial explanation for why Hong Kong's re-exports are more valuable than its imports. When extended to allow for

[36]Route length, and its associated transport time can, of course, play a role in determining the allocation of goods across indirect and direct routes when both transport modes are simultaneously available. To get around this, I first run the analysis using differences in the distance, to different destinations, of direct shipments alone, which is not subject to the criticism about endogenous competition between modes.

[37]This result, of course, is predictable once one observes the negative relation between unit values and distance (Table IX) and the positive relation between charges and distance (Table XI).

[38]The reader will notice that indirect shipment costs rise much more slowly with distance than direct shipment costs. A footnote in the Conclusion summarizes some of my preliminary findings on the relative cost of direct and indirect shipment.

Table XI: Modelling Transport Charges and Selection Effects						
	Direct Imports			Indirect Imports		
	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(V/W)	Ln(Ch/W)	Ln(V/W)	Ln(V/W)	Ln(Ch/W)	Ln(V/W)
Ln(Ch/W)	.456* (207.6)		-.056* (2.6)	.412* (217.6)		-.124* (2.8)
Dist		.626* (34.6)			.174* (17.0)	
Dist^2		-.158* (28.9)			-.030* (14.5)	
% f′=0		83% (+)			92% (+)	
Products	384022	384022	384022	279589	279589	279589
Dummies	Y⊗O⊗P	Y⊗O⊗P	Y⊗O⊗P	Y⊗O⊗P	Y⊗O⊗P	Y⊗O⊗P
Rbar^2	.8600	.6028	.8074	.7843	.4468	.7186
N	775864	775864	775864	888533	888533	888533

infrequent direct transport opportunities, it might explain the mean difference between the unit value of U.S. indirect and direct imports and exports. It can even explain the impact of excess distance and the total route length on the price of Hong Kong re-exports and U.S. indirect imports, although it has greater difficulty with the impact of the direct route length on these prices, and with the impact of distance on the prices of indirect exports. There is, however, simply no evidence in favour of a "Washington Apples" effect. The data, instead, support a model of freight absorption by imperfectly competitive sellers. With freight absorption, the identification used in equations (1) and (2) above no longer holds, as time, through its inventory carrying cost, is a component of total transport costs and will influence the sales price of goods. In this case, it is impossible (but also unnecessary) to estimate the separate effect of transport charges on unit values and one must retreat, simply, to the reduced form of columns (1) and (3) of Table IX. Distance, through its affect on transport and inventory carrying costs, appears to reduce the sales price of goods. If so, the "markups" associated with the movements of goods through hubs are, if anything, understated.

Table XII: Selection Among Goods for Indirect Routings Dependent variable – Ln value to weight ratio or unit value			
	(1)	(2)	(3)
	Hong Kong Imports	U.S. Direct Imports	U.S. Direct Exports
RTQop	-1.19* (19.5)		
RTQop^2	1.18* (17.6)		
% f′=0	94% (-)		
Indirect Share		-.440* (25.2)	-.661* (46.6)
Indirect Share^2		.842* (38.1)	1.33* (67.2)
% f′=0		79% (-)	89% (-)
Products	1287	5313	5357
Dummies	Y,P	Y,P	Y,P
R^2	.8823	.6414	.6301
N	138146	435727	1097521

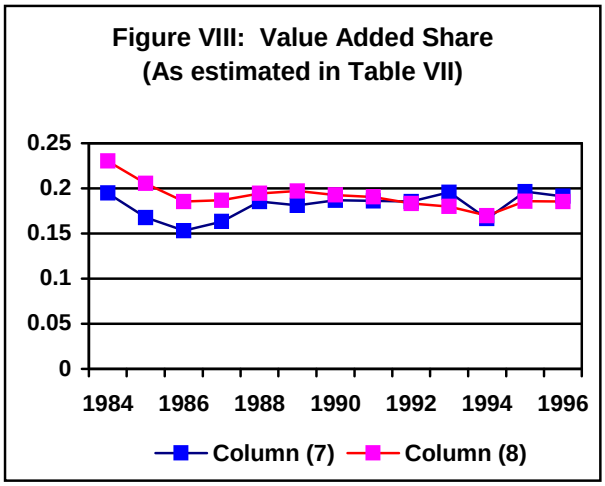
Before closing this section, I should note that selection effects apply not only to distance and transport costs, but also to the types of products that follow indirect routes. Table XII above regresses the Hong Kong import unit values, for each year x origin x product combination, on product and year dummies and the share of re-exports of that product from that origin in that particular year which roundtripped. As the reader can see, products which roundtripped a great deal had lower import prices. In columns (2) and (3) I regress the value to weight ratio of U.S. direct imports and exports on the share of the total weight of shipments of that origin (or destination) cross product combination that followed indirect routes in that year. The more imports of a particular product from a particular origin followed indirect routes, the cheaper were the direct imports themselves, with an analogous effect for exports. These results are consistent with a processing interpretation of indirect shipment. Goods which tend to roundtrip or follow indirect routes are unfinished, and hence cheaper, when seen moving on direct routes.

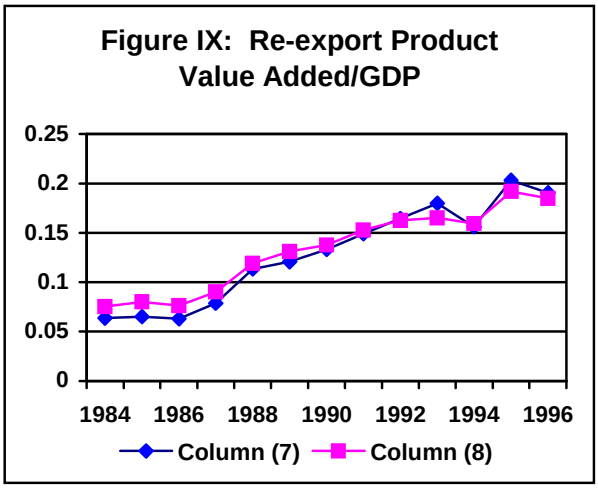
V. Conclusion

This paper argues that the circuitous movement of goods through hubs like Hong Kong and the Netherlands is not driven, solely, by transport considerations, but is also due, at least in part, to the role the hubs play in the transformation and marketing of the goods themselves. To this end, I have shown that the apparent price changes associated with indirect transport are systematically associated with measures of the "perversity" (from the point of view of transport) of the routes taken, e.g. roundtripping and excess distance. These price changes, in particular, the price increases observed after goods have followed circuitous routes, do not appear to be driven by selection effects associated with distance related transport costs, as the data indicate that transport charges are either negatively related, or, at best, unrelated, to unit values. In a later draft I hope to include a fuller analysis of the differences in the cost of indirect and direct transport, and how these relate to the paths goods follow and their associated price changes.[39]

While, in this paper, I have not tried to distinguish between the relative role of "transformation" and "information" in conferring product value added, the aggregate data are strongly supportive of the notion that marketing plays a substantial role. Figure VIII below graphs the average annual "markup", or value added share, of Hong Kong re-exports, as estimated by the specifications in columns (7) and (8) of Table VII earlier in Section III. Figure IX then takes these markups, estimated off of goods with unit values, and applies them to the

[39]I am still gathering the information on vessel and goods movements necessary to complete the analysis. My preliminary results, using incomplete data, are that: (1) The incidence of simultaneous indirect and direct shipments does not fall off precipitously as one moves from annual to monthly data. This, combined with data on vessel movements, suggests that direct shipment opportunities are generally available and compete, intratemporally, with indirect shipment. (2) Subject to some caveats concerning reporting and statistical bias, indirect shipments appear to be cheaper. This could be a compensation for their greater route length and associated transport time. (3) There is evidence of economies of scale, with the cost of individual shipments through hubs declining with the total volume of shipments along those routes. However, conclusions regarding the level at which the economies of scale operate, i.e. aggregate or product specific, depend upon the degree of bias introduced by the endogenity of the value to weight ratio (see equation (2) in Section IV earlier). It is difficult to think of an instrument for the value to weight ratio that will not also, independently, influence transport charges, so this issue is hard to resolve.





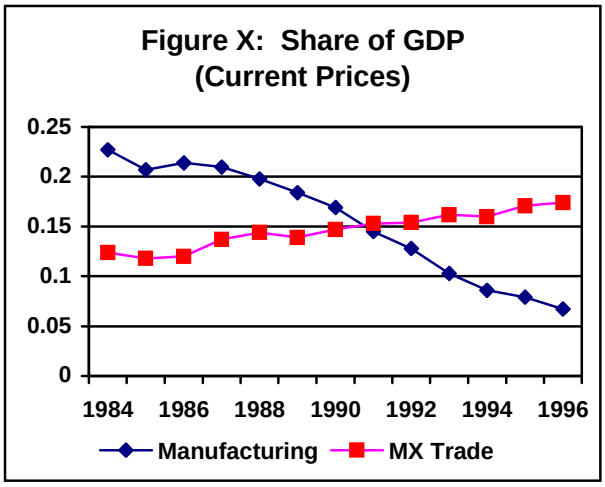
totality of re-export trade, to arrive at an estimated contribution to GDP. At between 6% and 8% of GDP in 1984, the estimated share of re-export trade had risen to 18%-19% by 1996. During the same period, as shown in Figure X further below, the share of manufacturing in aggregate GDP fell from 23% to 7%, as Hong Kong industry relocated to Mainland China. While the precise estimates of the value added involved in re-export trade vary somewhat according to the specification, and are also sensitive to the level of aggregation or method of weighting,[40] the

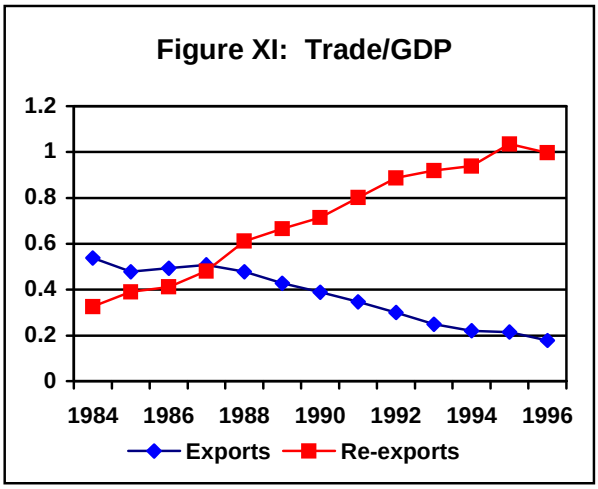
[40] As noted earlier in Section III, the mean ln markup of the observations used to estimate column (7) in Table VII is close to 40%, which is much greater than the 20% profit share graphed in Figure VIII. In Figure VIII, I use the formula:

$$\text{Avg. Profit share} = \frac{\sum[\text{Pr}(i) - \text{Pm}(i)]\text{Q}(i)}{\sum \text{Pr}(i)\text{Q}(i)} = \frac{\sum[1 - \exp\{\text{-lnmarkup(i)}\}]\text{Pr}(i)\text{Q}(i)}{\sum \text{Pr}(i)\text{Q}(i)}$$

where i represents each observation in the regression, Pr and Pm are the associated re-export and import unit values, Q the re-export quantities, and lnmarkup the predicted markup. This formula weights the markups by the volume of re-exports.

Another issue which arises, is that in many cases the ratio of re-export to import prices is less than one, implying negative markups, or extraordinarily high, implying astronomic profits. While losses and high profits may occur, measurement error might also play a role. Feenstra et al (1998a) approach this problem by eliminating observations where the annual quantity of re-exports exceeds the value of imports. This ameliorates the problem, but does not eliminate it. My approach is to use the predicted values of the regression equation, which removes the biggest outliers. This, similarly, ameliorates the problem but does not elminate it. For example, of the 378091 predicted values in column (7) of Table VIII, 68589 are negative and 34273 are greater than 100% . However, regardless of the approach or weighting one uses, the implied aggregate income is quite large. Feenstra et al (1998a)



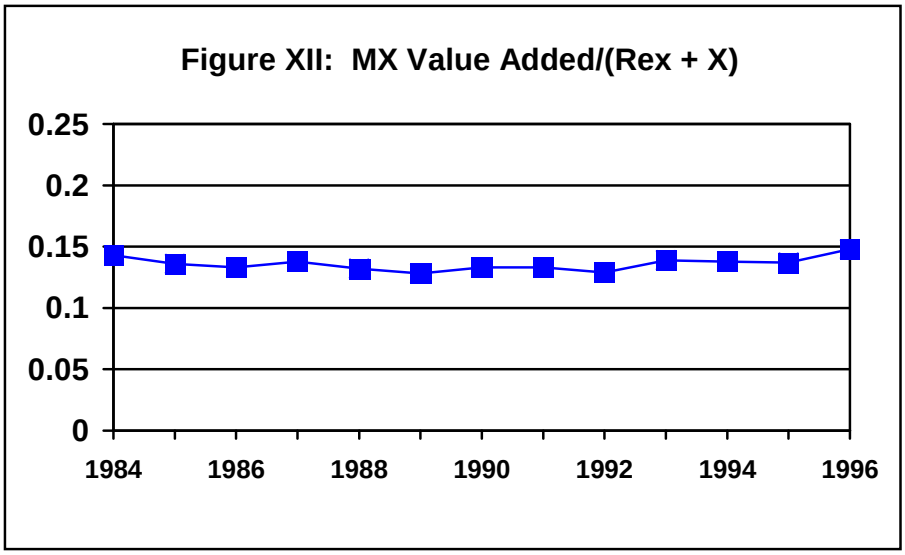


overall conclusion is inescapable. By the mid-1990s the incomes generated by the price changes that seem to occur between the time goods enter and leave the Hong Kong economy completely dwarfed manufacturing value added. Product processing would, in the main, appear in the surveyed value added of manufacturing firms. Although some understatement of manufacturing output is always possible, Hong Kong had, until the advent of economic reform in the Mainland, robust levels of measured manufacturing output and, historically, has kept fairly detailed records of that sector.[41] Most of the value added generated by re-export activity simply must reside in other sectors of the economy.

Much of the income associated with Hong Kong's re-export trade is probably generated by its import/export companies. Figure X graphs the share of these companies in Hong Kong's aggregate value added. In sharp contrast to manufacturing, the value added share of

report Hong Kong survey results of re-export markups of anywhere from 13% to 25% and, using Hong Kong and Chinese data, estimate markups, for China origin – U.S. destination re-export trade alone, of between 22% and 29%.

[41]In 1980, the first year for which estimates have been produced, manufacturing is believed to have contributed to 24% of GDP at factor cost (Estimates of Gross Domestic Product 1961 to 1997). The first large scale survey of the manufacturing sector was the 1971 Census of Manufacturing Establishments.



import/export companies has risen steadily, from about 12% of GDP in the mid-1980s to 17% by 1995. Historically, Hong Kong's thousands of import/export companies marketed the output of domestic manufacturers, and also provided specifications and raw materials for goods made to order. As shown in Figure XI, between 1984 and 1996 the volume of domestic exports as a share of GDP collapsed. During the same period, however, re-export activity grew rapidly. In Figure XII, above, I divide the value added of import/export companies by the sum of domestic exports and re-exports. As the Figure clearly shows, the incomes of these companies, as a share of the final sales price of total exports, has been remarkably constant suggesting that, from the perspective of these firms, there is little difference between intermediating domestic or international trade.[42] A substantial fraction of the income of the Hong Kong economy is derived

[42]I should note that the value added of import/export companies is measured independently of the trade statistics, using sectoral surveys, and is defined as the incomes of these companies minus the cost of goods sold (Estimates of Gross Domestic Product, as can be confirmed by examination of the Survey of Wholesale, Retail & Import/Export Trades, Restaurants & Hotels). In other words, the ratio of import/export value added to total exports is not constant by statistical construction.

from an internationally traded service, the intermediation of sources of demand and supply. The value added generated by this service is embodied, in the trade statistics, in the prices of goods.

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Appendix I: Sources and Distance Measures

Sources:

The United States import and export data are drawn from the Census Bureau's TM 380/780 Databanks. The databanks provide codes for the last (imports) or first (exports) port of lading or unlading, as well as for countries of origin and destination. These codes have evolved over time. Using documentation provided by the Census Bureau, as well as historical publications of Schedules C and K, I convert these codes to their largest common denominator, as explained in Section II of the text. Some codes are not listed in any of the available sources, and are, consequently, renamed "unknown." I drop unknowns, as well as all entries with zero weights, valuations or charges, from the analysis. The data sets record the coastal district of entry, with six districts prior to 1995 and nine thereafter. I combine the nine districts to re-create the original six regions. The data sets also record the US port of entry, but I do not differentiate the data on this basis. It does not seem sensible to differentiate between Long Beach vs Los Angeles, or Baton Rouge vs New Orleans, as separate markets of origin or destination, or to look for identification of distance effects from the small distances separating such ports.

Having reclassified the data into a consistent coding, I then collapse (i.e. sum) all the weights and valuations within each coding class. I do this to prevent changes in the underlying definitions from arbitrarily swinging the number of observations in each category. For example, with the dissolution of the Soviet Union, or the breakup of U.S. coastal districts into multiple categories, the number of "observations" in the original data set associated with those categories rises. By summing the weight and valuations in each category I keep its weight in the estimation of the regression consistent across the years. I should note that I have experimented with weighting the regressions in Section III using the total tonnage shipped, and the results are much the same.

Regarding Hong Kong, the data are provided by the Trade Statistics Dissemination Section of the Department of Statistics. As in the case of the U.S. data, after constructing a consistent coding, adjusting for all the changes in SITC and country categories over the years, I collapse the observations so as not to have the regression unintentionally weighted by the number of observations produced by the evolving product and country definitions. In doing so, I take care to keep track of which product groups involve consistent unit measures, across all years. For those which do not, I drop the quantity measures. For many products, to begin with, no quantity data is supplied. Of the 1745 "harmonized" product categories appearing in the re-export files, 1574 have consistent quantity measures. Of these 258 have a consistent measure of "no quantities", leaving 1316 categories with consistent non-zero unit measures. The analysis of unit values in Section III uses these data (the number of product categories appearing in Table VII is considerable less because of the observations lost in merging the re-export files with the import and export files). When estimating the overall value added for re-export activity, I take the weighted average markup estimated from those products with consistent quantity data, and apply it to the totality of re-exports (as explained in Section V).

Distance Measures:

The standard measure of distance used in empirical trade papers is the Great Circle Distance. Great Circle arcs, which are the shorter of the two arcs created by the intersection of a sphere and the plane formed by two points on the sphere and the origin, are the shortest route between any two points on a sphere. Great Circle arcs, however, may pass through the North and South Poles, which are not conventionally navigable. I construct an alternative measure, the Modified Great Circle Distance, which calculates the minimum distance between any two points on a sphere subject to latitude restrictions. I restrict all arcs to lie below the Arctic Circle ($66^{o}33'$N) and above $60^{o}00'$S (in the case of the few locations which lie above the Arctic Circle, such as Svalbard Island, I allow all paths to and from that location to attain their apogee at the latitude of that location). The formula for the Modified Great Circle distance is presented, and proven, in an appendix, "Minimum Spherical Distances Subject to Polar Restrictions", available upon request from the author.

The Modified Great Circle Distance has the undesirable property that it allows for navigation over land masses. Thus, the shortest distance between Egypt and Upper Volta lies through the heart of the Sahara desert, while ocean transport via Gibraltar probably represents the more likely route. Using ocean transport distances, however, presents its own problems as when, for instance, one concludes that Italy is really quite distant from Germany. When thinking about the total distance between countries, and the excess distance involved in certain routings, one would want, in some cases, to allow transport over land masses (when the infrastructure exists), but would want to exclude it in others. There is no satisfactory solution to this problem. Fairplay Publications produces a CD-Rom which allows the computation of total ocean navigation distances between ports. I used the data from this CD-Rom to replace about half of the distances on the U.S. legs of my analysis (the interface is tedious, and prevents the easy extraction of a full matrix of distances). The results were basically unchanged, as the ocean navigation distances turn out to be highly correlated with the Modified Great Circle Distance (which is, incidentally, also highly correlated with the Great Circle Distance). I hope to complete the extraction from the Fairplay CD-Rom at a later date, and rerun the regressions with ocean navigation distances, alone.

In picking a point to represent each country, I select the most populous city. The exception, as noted in the text, is the United States, where, in the national level analysis, I pick Chicago as the weighted average centre of American economic activity. For the computations using the Fairplay distance measures, I have been using each nation's principal port and computing distances to the cities I designated as the economic centres of the individual U.S. coastal districts (see discussion in Section III).

In sum, my experience is that the choice of distance measure has virtually no impact on the results, as the various measures are all highly correlated. In this draft I use the Modified Great Circle Distance between principal cities.