

The Impact of Outsourcing to China on Hong Kong's Labor Market

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A striking feature of the world economy is the increasing globalization of production. For example, Robert Feenstra (1998) describes the remarkable international specialization in the production of Barbie dolls: "The raw materials for the doll (plastic and hair) are obtained from Taiwan and Japan. Assembly used to be done in those countries, as well as the Philippines, but it has now migrated to lower-cost locations in Indonesia, Malaysia, and China. The molds themselves come from the United States, as do additional paints used in decorating the dolls." The growth in international specialization can also be observed in aggregate statistics. William Zeile (1997) and Gordon Hanson et al. (2003) document the importance of trade within multinational firms. David Hummels et al. (2003) show that trade in intermediate inputs has grown faster than trade in final goods.

While the globalization of production may yield important productivity benefits, there is a widespread view that it has also adversely affected low-skilled workers. There are frequent media reports on how low-skilled workers in developed countries are hurt when manufacturing jobs are relocated to low-wage countries. Many politicians in the United States and in many other countries have picked up on this theme to push for greater restrictions on trade with developing countries. Yet, despite its prominence in the public debate, there is little systematic evidence of the extent to which low-

skilled workers are harmed by outsourcing to poor countries.¹

This paper seeks to fill this gap by measuring the impact of outsourcing to China on low-skilled workers in Hong Kong. There are several reasons why Hong Kong's experience is of interest. First, outsourcing from Hong Kong to China was triggered by a clearly identifiable event—China's decision to open its market to foreign investors in 1980—which was arguably exogenous to economic forces in Hong Kong. Second, as the paper will document, the resulting relocation of production from Hong Kong to China is one of the largest cases of increased outsourcing in world history. Finally, there is suggestive aggregate evidence that outsourcing to China had an important effect on the relative demand for less-skilled workers in Hong Kong. For example, the large relocation of production from Hong Kong after China's liberalization to foreign investment in 1980 was associated with roughly a 5-percentage-point increase in the Mincerian return to education in Hong Kong from 1981 to 1996 (Figure 1).

The paper presents two pieces of evidence linking China's opening to these labor market trends. First, it decomposes the aggregate shift in the relative demand for less skilled workers into shifts "within" the manufacturing sector and "between" the manufacturing and outsourcing services sector. This exercise shows that the *reallocation* of workers from the manufacturing sector to outsourcing-related services accounts for 10 to 20 percent, and relative demand shifts *within* individual manufacturing industries account for 25 to 35 percent, of the economy-wide decline in the relative demand for less skilled workers.

Second, the paper focuses on the relative demand shifts in the manufacturing sector. To

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¹ Feenstra and Hanson (1996, 1999) measure the effect of outsourcing on low-skilled workers in the United States.

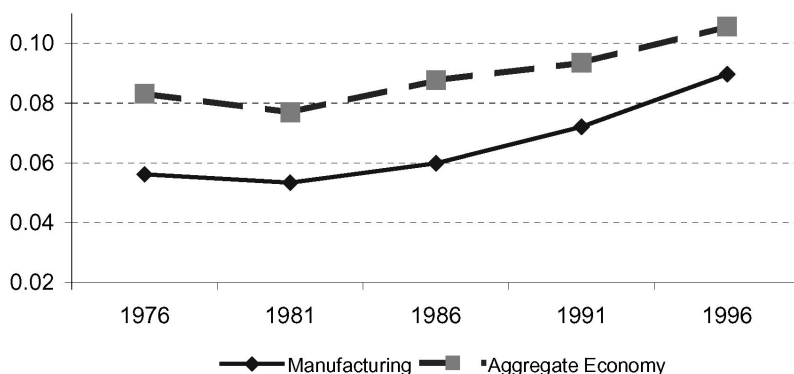


FIGURE 1. RETURNS TO EDUCATION IN HONG KONG, 1976–1996

Note: Coefficients from OLS regression of log monthly wage on years of schooling (other covariates include an indicator variable for sex and a quadratic in potential experience) from Hong Kong Population Censuses of 1976, 1981, 1986, 1991, and 1996.

measure the effect of outsourcing, we exploit the fact that while China's opening had an important effect in all industries, it had a larger effect in labor-intensive industries. Using this differential impact, we show that relative demand shifts have been larger in labor-intensive industries that were more affected by the possibility of outsourcing to China (when compared to other industries). These estimates suggest that outsourcing to China can explain 40 to 50 percent of the relative demand shifts in the manufacturing sector. In addition, these results are robust to a number of controls for such trends and to the use of pre-existing industry characteristics as instruments for the differential impact of China's liberalization.

The paper proceeds as follows. Section I presents aggregate evidence on the rise in outsourcing and the sharp decline in the relative demand for less-skilled workers. It then decomposes these relative demand shifts into shifts due to the reallocation of resources from the manufacturing to the services sector, and to relative demand shifts within specific manufacturing industries. Section II turns to the manufacturing sector and measures whether industries that have seen more outsourcing to China have also experienced a larger increase in their relative utilization of skilled workers. The final section concludes.

I. Aggregate Trends

For most of the post-World War II era, Hong Kong specialized in the manufacture of low-skilled, labor-intensive manufacturing goods.² In 1980, as part of its market-oriented reforms, China opened its economy to foreign investors. The consequence was a large relocation by Hong Kong manufacturers of their production facilities to southern China. The relocation of production to China was accompanied by an increase in the demand for services relating to outsourcing and entrepôt trade.³ Hong Kong firms typically kept their headquarters in Hong Kong, where they managed their production facilities in China. In addition, these firms typically exported the processed output to Hong Kong for final processing before shipping the finished product to its final destination.⁴

As examples of the economic activities in Hong Kong driven by China's opening to foreign trade and investment, consider the experience of two Hong Kong companies: the Liton Company and Li & Fung. The Liton Company

² See Suzanne Berger and Richard Lester (1997) and Ronald Findlay and Stanislaw Wellisz (1993).

³ See Michael Enright et al. (1997), Yun-Wing Sung (1991, 1995), and Barry Naughton (1996).

⁴ See Feenstra and Hanson (2001), Reginald Kwok and Alvin So (1995), and Sung (1991).

TABLE 1—SHARE OF EMPLOYMENT BY SECTOR (PERCENT)

	1971	1976	1981	1986	1991	1991
Agriculture	3.8	1.7	1.4	1.7	1.0	0.5
Manufacturing	41.2	41.5	39.3	35	29.9	19.0
Traded services	31.8	32.5	33.2	37.3	39.6	49.0
Non-traded services	23.2	24.3	26.1	26.0	29.5	31.5

Notes: Authors' tabulations from Hong Kong Population Censuses. Traded services is defined as wholesale trade, import and export trade, banking, insurance, accounting, legal and other business services; storage and warehouse services; transportation services; and communication services. Nontraded services are utilities, construction, community and social services; recreational and cultural services; personal and household services; and retail trade.

is an original equipment manufacturer of audio-visual equipment.⁵ Liton opened an assembly plant in Shenzhen (across the border from Hong Kong) in 1985. While the assembly jobs were shifted to this new plant, Liton's headquarters remained in Hong Kong. Liton's workers in Hong Kong focused on procuring contracts, designing and manufacturing the prototypes, and marketing and distributing the finished products. For example, when Liton obtained a contract for 10,000 stereos, its engineers in Hong Kong designed the product based on the customer's specifications. In addition, before manufacturing the stereos in the Shenzhen factory, Liton produced a first batch of 1,500 stereos in its Hong Kong plant to standardize and remove the kinks in the production process. Finally, after the stereos were produced by Liton's factory in Shenzhen, they were exported to the final customers through Hong Kong's port.

The second company, Li & Fung, is one of the largest companies in Hong Kong. In 2002, Li & Fung had revenues of \$2.3 billion and employed 5,700 people.⁶ As described by Feenstra and Hanson (2001), Li & Fung is an intermediary between foreign manufacturers or retailers and independent production plants in China. Li & Fung's services range from matching a foreign retailer with a Chinese contractor to managing the entire subcontracting process. The latter would involve everything from ordering the raw inputs to monitoring the production

process by the chosen subcontractor, to shipping the product to the final customer.

One way to measure the importance of companies such as Li & Fung is by the employment share of outsourcing services. In Table 1, outsourcing services ("traded" services) are defined as wholesale trade, import and export trade, banking, insurance, accounting, legal, and other business services; storage and warehouse services; transportation services; and communication services. Table 1 indicates that the employment share of "traded" services increased sharply in the early 1980s, from 33 percent in 1981 to almost 50 percent by 1996.

Another statistic that measures outsourcing to China is Hong Kong's reexports of Chinese origin (Figure 2). Reexports are goods produced in China, either by subsidiaries of firms such as the Liton Corporation or by subcontractors of firms such as Li & Fung. After they are manufactured in China, these products are typically imported into Hong Kong from where they are reexported to their final destination. Figure 2 indicates that Chinese reexports were insignificant in the 1970s but started to increase in the early 1980s. At the same time, the share of *non-Chinese* reexports has remained roughly constant and the share of "domestic" exports has actually declined.

It is useful to compare the magnitude of outsourcing from Hong Kong to China with that of outsourcing from the United States to developing countries. Eli Berman et al. (1994) measure outsourcing from the United States by the share of intermediate inputs purchased from abroad as a fraction of total intermediate inputs. Feenstra and Hanson (1996) use a broader measure, defining outsourcing as the share of U.S. imports as

⁵ This case study is from Ching-Kwan Lee (1998).

⁶ Li & Fung's 2002 annual report (<http://www.lifung.com/investor/index.html>).

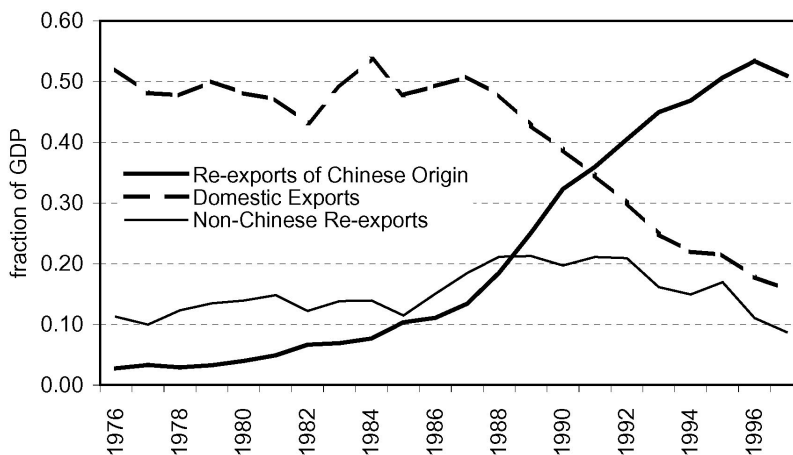


FIGURE 2. HONG KONG'S DOMESTIC EXPORTS AND REEXPORTS

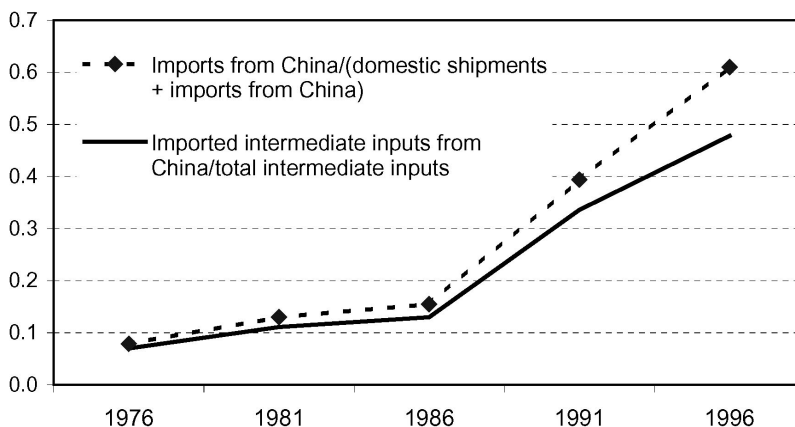


FIGURE 3. OUTSOURCING FROM HONG KONG TO CHINA

a fraction of the sum of domestic shipments and imports. Figure 3 uses these two definitions of outsourcing to measure outsourcing from Hong Kong to China.⁷ By either measure, outsourcing to China has accelerated sharply since 1980. In addition, the magnitude of this increase is substantially larger than that observed in the United States. For example, Feenstra and Hanson's (1996, Table 6.2) estimates indicate that out-

⁷ Robert Lawrence (1994) and Matthew J. Slaughter (2000) define outsourcing narrowly as the quantity of intermediate inputs purchased by a multinational firm from its subsidiaries.

sourcing from the United States to developing countries increased by an average 0.656 percentage points per year from 1979 to 1987. Using a similar definition, outsourcing from Hong Kong to China increased at an average annual rate of 2.7 percentage points per year from 1976 to 1996, or roughly four times larger than the U.S. increase.

Turning to the labor market, there is abundant evidence since the early 1980s of sharp relative demand shifts favoring skilled workers. To begin, a standard measure of the returns to skill is the return to education. Figure 1 shows that by this measure, the skill premium has increased sharply

TABLE 2—RELATIVE EMPLOYMENT AND WAGE OF SKILLED WORKERS

	1971	1976	1981	1986	1991	1996
Panel A: High-school-educated (O Level +) workers						
<i>Aggregate economy</i>						
Employment share	0.238	0.278	0.358	0.441	0.510	0.592
Relative wage (log)		0.599	0.475	0.479	0.487	0.519
<i>Manufacturing</i>						
Employment share	0.146	0.189	0.250	0.308	0.384	0.511
Relative wage (log)		0.449	0.388	0.392	0.471	0.521
Panel B: Nonproduction workers						
<i>Aggregate economy</i>						
Employment share	0.233	0.225	0.330	0.409	0.443	0.517
Relative wage (log)		0.734	0.539	0.571	0.588	0.660
<i>Manufacturing</i>						
Employment share	0.113	0.118	0.170	0.218	0.315	0.484
Relative wage (log)		0.757	0.616	0.656	0.649	0.656

Note: Author's tabulations from Hong Kong Population Censuses.

since 1981. Specifically, from 1981 to 1996, the returns to schooling increased by 5 percentage points in the aggregate economy and by more than 6 percentage points in the manufacturing sector.⁸

Table 2 provides additional evidence of these labor market shifts. Panel A presents the employment share and relative wage of high-school-educated workers (defined as workers who have passed their O-level examinations in Hong Kong's British education system) relative to that of non-high-school-educated workers.⁹ In addition, since the only classification of skill in the widely used U.S. Census of Manufactures is production/nonproduction workers, the table also presents the relative employment and wages of nonproduction workers relative to that of production workers in Hong Kong (panel B).

As can be seen, using either classification of skill, the relative employment of skilled workers was roughly constant from 1971 to 1976, but started to increase after 1976. The post-1976 increase in the relative employment of skilled

workers was accompanied by a *fall* in the relative wages of skilled workers from 1976 to 1981. However, after 1981, the increase in the relative employment of skilled workers was accompanied by an *increase* in their relative wages. This suggests that, since the early 1980s, there were large relative demand shifts favoring skilled workers. For example, the employment share of nonproduction workers in the manufacturing sector in Hong Kong increased by more than 2 percentage points per year from 1981 to 1996. For comparison, the employment share of nonproduction workers in the United States increased at an average rate of 0.56 percentage points per year from 1979 to 1987, which is about one-fourth of the increase in Hong Kong.¹⁰

Regardless of the measure used, the evidence is clear: there have been sharp and persistent relative demand shifts in Hong Kong favoring skilled workers since the early 1980s. The next section presents some simple decompositions to gauge the potential contribution of China's opening to foreign trade and investment to these labor market trends in Hong Kong.

II. Decomposing Relative Demand Shifts

There are two channels by which China's opening could have lowered the relative demand

⁸ The estimates in Figure 1 are based on micro-data from the Hong Kong Population Census (see Appendix for further details). Because of the large samples, the returns to schooling are very precisely estimated. For example, the standard errors of the estimates of the returns to education in the aggregate economy are 0.0011 for 1976, 0.0004 for 1981, 0.0003 for 1986, 0.0004 for 1991, and 0.0002 for 1996.

⁹ We use this classification rather than the standard breakdown into college- and non-college-educated workers since college-educated workers account for less than 10 percent of the workforce in Hong Kong.

¹⁰ Berman et al. (1994), Table 1.

for less-skilled workers in Hong Kong. First, if outsourcing services are more skilled-labor intensive than the manufacturing sector, the increased demand for outsourcing services and the resulting reallocation of workers away from the manufacturing sector will lower the aggregate relative demand for less-skilled workers. The importance of this reallocation effect depends on the magnitude of the sectoral shift and on the gap in skill intensity between the manufacturing and the outsourcing services sector. Second, in Feenstra and Hanson's (1996) model of trade in intermediate inputs, the migration of low-skill intensive manufacturing jobs to China will lower the relative demand for less-skilled workers *within* manufacturing industries.¹¹ The importance of the Feenstra-Hanson effect depends on the magnitude of the "within-industry" relative demand shifts in the manufacturing sector and on the importance of the manufacturing sector in the aggregate economy.

A simple way to gauge the magnitudes of these effects is to decompose the aggregate change in the relative employment (or wage-bill) share of skilled workers into the following three terms:

$$(1) \quad \Delta D_t = \Delta E_t^{services} (D_t^{services} - D_t^{mfg}) \\ + \Delta D_t^{mfg} \cdot E_t^{mfg} + \Delta D_t^{services} \cdot E_t^{services}.$$

Here, D_t , D_t^{mfg} , and $D_t^{services}$ denote the relative demand for skilled workers (measured as the employment share or wage-bill share of skilled workers) in the aggregate economy manufacturing sector and service sector, respectively. In turn, $E_t^{services}$ and E_t^{mfg} denote the employment share of the service sector and the manufacturing sector, respectively. The first term in equation (1) measures the change in the aggregate employment share of skilled workers due to the *reallocation* of workers from the manufacturing sector to the service sector. The second and third terms measure the aggregate labor market effect of changes in the relative utilization of

skilled workers in the manufacturing sector and service sector, respectively.

As mentioned, there are two channels by which outsourcing to China could have lowered the relative demand for less-skilled workers in Hong Kong. First, if outsourcing services are skilled-labor intensive, the shift toward this sector can lower the aggregate relative demand for less-skilled workers. This effect is captured by the first term in equation (1). Second, the migration of low-skilled production jobs within specific manufacturing industries—the Feenstra-Hanson (1996) mechanism—will lower the relative demand for less-skilled workers within individual manufacturing industries. To measure this second effect, we can decompose the change in the relative demand for skilled workers in the manufacturing sector into the following two terms:

$$(2) \quad \Delta D_t^{mfg} = \sum_j (\Delta E_{t,j}^{mfg} \cdot D_{t,j}^{mfg}) \\ + \sum_j (\Delta D_{t,j}^{mfg} \cdot E_{t,j}^{mfg}).$$

Here, j indexes individual manufacturing industries. This is the standard "between within" decomposition, but limited to the manufacturing sector. The first term reflects the reallocation of workers *between* different manufacturing industries. The second term measures the contribution of relative demand shifts *within* manufacturing industries. The effect of outsourcing via the Feenstra-Hanson mechanism can be measured as the product of the within-industry demand shifts in the manufacturing sector—the second term in equation (2)—and the employment share of the manufacturing sector (E_t^{mfg}).

Based on this accounting framework, Table 3 presents estimates of the magnitude of these two effects. Panel A presents the decomposition of the change in the employment and the wage-bill share of high-school-educated workers. The first column presents the average annual change in the employment share of high-school-educated workers in the aggregate economy. The second column presents estimates of the sectoral shift effect ($\Delta E_t^{services} \cdot (D_t^{services} - D_t^{mfg})$), and the third column presents the Feenstra-Hanson effect ($E_t^{mfg} \cdot \sum_j (\Delta D_{t,j}^{mfg} \cdot E_{t,j}^{mfg})$). As can be seen, the sectoral reallocation accounts for about 16 per-

¹¹ See Alan Deardorff (2001), Avinash Dixit and Gene Grossman (1982), and Ronald Jones (2001) for related models of trade with intermediate inputs.

TABLE 3—DECOMPOSING AGGREGATE SHIFT IN RELATIVE DEMAND FOR SKILLED WORKERS

Panel A: Change in share of high-school-educated workers												
	Employment share					Wage-bill share						
	Aggregate change	Aggregate change due to			Within sectors		Aggregate change	Aggregate change due to			Within sectors	
		Reallocation to services	“Within” mfg.	“Within”	Mfg.	Services		Reallocation to services	“Within” mfg.	“Within”	Mfg.	Services
1971–76	0.19	–0.01	0.18	0.39	0.04							
1976–81	2.16	0.21	0.57	1.32	1.77	1.54	0.28	0.49	1.47	1.22		
1981–86	1.74	0.17	0.43	1.13	1.24	1.84	0.18	0.37	1.31	1.03		
1986–91	1.31	0.28	0.45	1.39	0.66	1.27	0.13	0.48	1.92	0.70		
1991–96	1.62	0.27	0.48	2.02	0.74	1.47	0.18	0.41	2.02	0.67		

Panel B: Change in share of nonproduction workers												
	Employment share					Wage-bill share						
	Aggregate change	Aggregate change due to			Within sectors		Aggregate change	Aggregate change due to			Within sectors	
		Reallocation to services	“Within” mfg.	“Within”	Mfg.	Services		Reallocation to services	“Within” mfg.	“Within”	Mfg.	Services
1971–76	–0.35	0.01	0.04	0.08	–0.32							
1976–81	2.18	0.28	0.39	0.91	1.73	1.74	0.31	0.30	0.92	1.37		
1981–86	1.64	0.24	0.37	0.97	0.97	1.87	0.22	0.32	1.47	0.89		
1986–91	0.77	0.34	0.59	1.82	–0.17	0.78	0.14	0.59	2.37	0.01		
1991–96	1.44	0.22	0.72	3.03	0.35	1.46	0.13	0.58	2.90	0.49		

Notes: Unit is $100 \times$ average annual change of the relevant variable. Aggregate change due to “within-industry” manufacturing shifts is product of employment share of manufacturing sector and sum of within-industry shifts in individual manufacturing industries. Aggregate change due to reallocation to services is product of change in employment share of services and gap in skill intensity between the service sector and the manufacturing sector. See text for further details.

cent of the aggregate relative demand shift from 1981 to 1996. In turn, within-industry relative demand shifts in the manufacturing sector account for roughly 30 percent of the aggregate relative demand shift. The decomposition of the wage-bill share provides similar results, as does the decomposition of the employment and wage-bill share of nonproduction workers (panel B).

There are two important limitations to this decomposition. First, although much of the shift to business services is dedicated to outsourcing services in China, some of these services might be dedicated to managing trade with other Asian countries. Second, other factors—such as skill-biased technical change—will also result in skill upgrading within detailed industries. Therefore, we cannot attribute all the within-industry relative demand shifts in the manufacturing sector to outsourcing. However, since forces such as skill-biased technical change

(SBTC) are likely to result in skill upgrading throughout the economy, we can compare the importance of within-industry shifts in the manufacturing sector with that in the nonmanufacturing sector to gauge the potential magnitude of these forces. In the United States, for example, there is a large body of evidence that within-industry relative demand shifts play as large a role in the nonmanufacturing sector as in the manufacturing sector.¹²

In contrast, within-industry shifts in Hong Kong’s service sector are generally smaller than in the manufacturing sector. In particular, within-industry shifts in the manufacturing sector are

¹² See, for example, David Autor et al. (1998), John Bound and George Johnson (1992), Kevin Murphy and Finish Welch (1992), and Lawrence F. Katz and Murphy (1992). See Berman et al. (1998) for similar evidence from the United Kingdom.

more than twice as large as in the service sector after 1986 (columns 4 and 5). If forces such as SBTC had the same effect in the manufacturing sector as in the nonmanufacturing sector, this suggests that roughly half of the within-industry shifts in the manufacturing sector are driven by SBTC (and the remainder due to outsourcing). Assuming that the remainder of the within-industry shifts is due to outsourcing, this suggests that about 15 percent ($1/2$ of 30 percent) of the aggregate relative demand shift in Hong Kong can be attributed to the relocation of low-skilled jobs within specific manufacturing industries. A simple back-of-the-envelope estimate thus suggests that roughly 30 percent of the aggregate relative demand shift can be attributed to China's opening, of which half is due to the reallocation toward outsourcing services and half due to the Feenstra-Hanson effect.

This estimate obviously has to be taken with caution, if only because it is possible that the rate of SBTC in the manufacturing industry differs from that in the services sector. To obtain more precise estimates of how much of the within-industry shifts in the manufacturing sector can be attributed to outsourcing, the next section turns to a comparison of the magnitude of relative demand shifts across different manufacturing industries.

III. Outsourcing and Within-Industry Skill Upgrading

This section focuses on the manufacturing sector and turns to cross-industry regressions to measure the impact of outsourcing to China on skill upgrading in the manufacturing sector. The ideal experiment to do this would be one in which a small economy is subject to large outsourcing "shocks." In addition, we would ideally want these shocks to be randomly allocated across industries. Although Hong Kong's experience is ideal in the sense that China's opening was exogenous to Hong Kong and had a large effect on its economy, the main limitation is that it affected all industries at the same time. Hong Kong's experience, however, still offers empirical leverage because although China's opening had an important effect in all manufacturing industries, it had a larger effect in industries that were more labor intensive and unskilled-labor intensive.

This differential response is clearly endogenous to the characteristics of the industry. If these characteristics are fixed over time, we can exploit the differential impact to measure the effect of China's opening on Hong Kong's labor market by comparing the change in outsourcing in an industry with the change in skill intensity in the industry. Nonetheless, it is still possible that there were differential pre-existing trends in within-industry skill upgrading which are correlated with the differential impact of China's opening across industries in Hong Kong. To take just one example, it might be the case that the industries that were more affected by outsourcing to China were the ones that were already experiencing higher rates of skill-biased technical change. We do two things to address this possibility. First, we introduce controls for such trends. Second, we instrument for the change in outsourcing after 1980 with measures of the labor intensity of an industry in the 1970s.

With the limitations of simple OLS estimates in mind, we begin by showing the OLS estimates of the relationship between the change in outsourcing and the relative demand shift. Specifically, we use Feenstra and Hanson's (1996) adaptation of Berman et al.'s (1994) regression framework:¹³

$$(3) \quad \Delta D_{t,j} = \beta_1 \Delta Out_{t,j} + \beta_2 \Delta \ln(K_{t,j}/Y_{t,j}) \\ + \beta_3 \Delta \ln Y_{t,j} + \beta_r Time_t.$$

The dependent variable is the change in the wage-bill share of skilled workers in an industry, and the key independent variable is the change in outsourcing in the industry ($\Delta Out_{t,j}$). The equation also includes controls for capital-

¹³ This equation is based on a model in which capital is treated as a quasi-fixed factor and skilled and unskilled labor are variable cost factors. If the cost function for each industry is translog and production exhibits constant returns to scale, then cost minimization yields a standard equation for the share of skilled workers in total employment. After differencing this factor share equation to remove industry fixed effects, we get equation (3) plus a term for changes in relative wages. The change in relative wages is typically left out of the equation, since cross-industry differences in this variable are likely due to differences across industries in worker quality.

TABLE 4—OLS ESTIMATES OF RELATIONSHIP BETWEEN INDUSTRY OUTSOURCING AND RELATIVE DEMAND SHIFT

	Dependent variable: $\ln(\text{non-production worker wage-bill share})$									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Independent variable:										
$\ln[\text{imports}/(\text{shipments} + \text{imports})]$	0.3125 (0.1084) [0.48]	0.2671 (0.1104) [0.41]	0.2759 (0.1242) [0.45]	0.2671 (0.1108) [0.41]	0.2888 (0.1297) [0.45]					
$\ln[\text{imported int. inputs}/(\text{shipments} + \text{imported int. inputs})]$						0.424 (0.1506) [0.43]	0.3548 (0.1490) [0.36]	0.3711 (0.1641) [0.39]	0.3600 (0.1518) [0.37]	0.3745 (0.1727) [0.38]
Controls:										
$\ln(K/Y)$ and $\ln(Y)$	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
1971–76 trends	No	No	Yes	No	No	No	No	Yes	No	No
World skill biased technical change	No	No	No	Yes	No	No	No	No	Yes	No
Industry dummies	No	No	No	No	Yes	No	No	No	No	Yes
R^2	0.55	0.59	0.65	0.59	0.48	0.54	0.59	0.65	0.59	0.47

Notes: Standard errors (clustered by industry) in parentheses. The observation is an industry-year period ($N = 54$). All regressions include time-period dummies. The brackets contain the share of a standard deviation of the dependent variable explained by a standard deviation increase in the independent variable. $\ln[\text{imports}/(\text{shipments} + \text{imports})]$ is change in share of imports from China as a fraction of imports from China and domestic shipments. $\ln[\text{imported int. inputs}/(\text{shipments} + \text{imported int. inputs})]$ is change in share of intermediate inputs imported from China. Control for 1971–76 trend is 1971–76 change in employment share of nonproduction worker in the industry. Controls for world skill biased technical change are worldwide rates of SBTC and change in wage-bill share of nonproduction workers in the United States.

skill complementarity (the capital-output ratio), cyclical output differences between industries, and time (to allow for the average changes in skill-intensity common to all industries).¹⁴

Based on this framework, Table 4 presents the estimates of β .¹⁵ The key independent variable in columns 1–5 is the change in the share of imports from China as a fraction of domestic shipments and Chinese imports. We allow the errors to be clustered by industry to allow for auto-correlation in the error terms.¹⁶ Column 1 presents the basic OLS estimate and shows that

¹⁴ Feenstra and Hanson (1999) develop an alternative methodology to measure the effect of outsourcing. Specifically, they regress the change in TFP adjusted prices that can be “explained” by outsourcing (obtained as the fitted value of a regression of the change in TFP adjusted prices on measures of outsourcing) on the factor cost shares. The advantage of this procedure is that it allows output prices to be endogenously determined by outsourcing. This is likely to be important for a large country such as the United States, but is probably less important for Hong Kong. In any case, we do not have the price data necessary to implement this procedure for Hong Kong.

¹⁵ Summary statistics are in shown in Appendix Table A1.

¹⁶ See Marianne Bertrand et al. (2004). We also estimated all the regressions allowing for clustering across time periods (rather than by industry). The standard errors in this case are almost always smaller than those that allow for

outsourcing is positively correlated with within-industry skill upgrading. β_1 is precisely estimated and quite large: the point estimate suggests that a one-standard-deviation increase in outsourcing increases skill upgrading by almost half of a standard deviation. Column 2 introduces controls for changes in the capital-output ratio and changes in output. The estimate of β_1 falls slightly but remains precisely estimated. The point estimate suggests that the average increase in outsourcing to China from 1981 to 1996 can “explain” about 40 percent of the increase in the wage-bill share of nonproduction workers over this time period.¹⁷

We want to reiterate that these estimates have to be interpreted with caution. The identifying assumption is that all the variation in outsourcing across industries is driven by the policy change in China and is uncorrelated with trends in skill upgrading across industries. It is clearly

clustering by industry. We do not present these estimates, but they are available from the authors.

¹⁷ From 1981 to 1996, the share of imports from China (as a fraction of domestic shipments and imports from China) increased at an annual average of 3.3 percent (see Figure 3) and the wage-bill share in the manufacturing sector by 2.36 percent (see Table 2). Therefore, $(0.2671 \times 3.3)/2.36 = 0.37$.

possible, however, that the industries that were already experiencing higher rates of skill upgrading were the ones that were more affected by outsourcing to China. To control for this possibility, column 3 introduces the 1971–1976 change in employment share of nonproduction workers as a control variable. As can be seen, this makes virtually no difference in the estimate: β_1 continues to be precisely estimated and large.

Second, there could be concurrent trends in forces such as SBTC which are correlated with the differential response to China's liberalization. For example, some industries could have experienced technological changes that made it easier to outsource low-skilled jobs. In this case, we will see increased outsourcing in this industry, but it is clearly inappropriate to attribute it to China's opening. To address this possibility, column 4 introduces two variables to control for such factors. These are: (a) worldwide rates of SBTC; and (b) industry-specific changes in the wage-bill share of nonproduction workers in the United States.¹⁸ When these two variables are introduced, the point estimate remains unchanged: the point estimate of β_1 remains positive and statistically significant, and indicates that a one-standard-deviation increase in outsourcing increases skill upgrading by 0.4 of a standard deviation.

Finally, an alternative manner to control for differential trends is to introduce industry fixed effects. This is done in column 5. Here, β_1 measures the correlation between the change in outsourcing relative to the trend in the entire period and the relative demand shift in an industry (again relative to the shift in the entire period). As can be seen, the resulting estimate of β_1 is similar to estimates shown in columns 1–4.

Columns 6–10 use an alternative measure of

outsourcing, namely the share of imported intermediate inputs from China. As can be seen, the estimates of β_1 are remarkably consistent across the five specifications. The point estimates are always precisely estimated and suggest that the average increase in outsourcing from 1981 to 1996 can explain 40 to 50 percent of the average increase in skill intensity over this time period.¹⁹

An alternative strategy to gauge the potential bias due to differential trends in skill upgrading is to identify instruments that are correlated with the differential impact of China's opening, but are plausibly not correlated with such trends. As previously mentioned, China's opening had an important effect in all manufacturing industries, but it had a larger effect in labor-intensive industries. We will use two measures of such ex ante differences in which industries were potentially affected by these reforms as instruments. The first instrument is the labor share of the industry in 1976. The idea is that labor-intensive industries are likely to be ones that were most affected by the possibility of relocation to China. The second instrument is the wage-bill share of nonproduction workers in 1976. This reflects the fact that outsourcing is likely to have had a larger effect in industries that utilized less-skilled workers more intensively.

The first-stage correlation between the instruments and the two measures of outsourcing is shown in Table 5. Panel A presents the estimates with the value-added share of labor in 1976 as the independent variable. As can be seen, initial labor intensity is highly correlated with outsourcing in an industry. The point estimates are always statistically significant and suggest that a one-standard-deviation increase in the labor share in 1976 is associated with an increase of roughly 70 percent of a standard-deviation in outsourcing. Panel B presents the estimates with the wage-bill share of nonproduction workers (also in 1976) as the independent variable. The coefficient estimates that have the correct sign are always statistically

¹⁸ The worldwide rates of SBTC are taken from Appendix 2 in Berman et al. (1998). We use their measure of worldwide SBTC from 1970 to 1980 as an estimate of SBTC in Hong Kong for the 1976–1981 subperiod and their measure of SBTC from 1980–1990 as an estimate of SBTC in Hong Kong for all the periods after 1981. The share of nonproduction workers in U.S. manufacturing industries is computed from the NBER-CES Manufacturing Industry Database (<http://www.nber.org/nberces/nbprod96.htm>).

¹⁹ The share of imported intermediate inputs from China increased by 2.7 percentage points per year (Figure 3) and the wage-bill share of nonproduction workers by 2.36 percentage points per year (Table 2).

TABLE 5—EXPLAINING DIFFERENCES ACROSS INDUSTRIES IN OUTSOURCING TO CHINA

	Dependent variable							
	dln[imports/(shipments + imports)]				dln[imported intermediate inputs/(shipments + imported intermediate inputs)]			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A:								
Independent variable:								
1976 value-added share of labor	18.43 (4.21) [0.88]	15.45 (5.43) [0.74]	16.11 (6.47) [0.77]	11.48 (4.45) [0.55]	12.22 (2.76) [0.89]	10.79 (3.17) [0.78]	11.29 (3.75) [0.82]	9.04 (2.87) [0.66]
R^2	0.60	0.64	0.65	0.85	0.60	0.64	0.65	0.84
Panel B:								
Independent variable:								
1976 wage-bill share of nonproduction workers	-5.47 (2.03) [0.26]	-3.91 (1.32) [0.19]	-4.20 (1.76) [0.20]	-3.00 (0.84) [0.14]	-4.07 (1.06) [0.30]	-4.60 (1.47) [0.33]	-4.66 (1.19) [0.34]	-2.19 (0.69) [0.16]
R^2	0.60	0.62	0.62	0.65	0.60	0.56	0.56	0.63
Controls:								
dln(K/Y) and dln(Y)	No	Yes	Yes	Yes	No	Yes	Yes	Yes
1971–76 trends	No	No	Yes	No	No	No	Yes	No
World skilled biased technical change	No	No	No	Yes	No	No	No	Yes

Notes: Standard errors (clustered by industry) in parentheses. The observation is an industry-year period ($N = 54$). All regressions include time-period dummies. The brackets contain the share of a standard deviation of the dependent variable explained by a standard deviation increase in the independent variable. dln[imports/(shipments + imports)] is change in share of imports from China as a fraction of imports from China and domestic shipments. dln[imported int. inputs/(shipments + imported int. inputs)] is change in share of intermediate inputs imported from China. Control for 1971–76 trend is 1971–76 change in employment share of nonproduction worker in the industry. Controls for world skill biased technical change are worldwide rates of SBTC and change in wage-bill share of nonproduction workers in the United States.

significant. When compared to the labor share, however, the initial skill intensity explains a smaller fraction of the variation in outsourcing across industries. Specifically, the point estimates in panel B suggest that a one-standard-deviation decrease in the 1976 share of skilled workers is associated with an increase of roughly 20 to 25 percent of a standard-deviation in outsourcing.²⁰

²⁰ A referee asked whether the correlation between the change in outsourcing and the instruments should be interpreted as an estimate of the permanent increase in the growth of outsourcing associated with China's opening to foreign investors or, alternatively, as an approximation of the short-run adjustment of Chinese imports to a new steady-state level of imports. We believe the latter interpretation is more reasonable. There is no reason why the policy change in China, considered in isolation, would have a permanent effect on the growth rate of imports from China. In addition, there is some evidence that the growth rate of

Table 6 presents the IV estimates. Panel A presents the estimates using the 1976 labor share as the instrument for the change in outsourcing in an industry. When the labor

imports associated with the policy change in China has increased over time in a manner consistent with a slow transition to a new steady-state level of imports. First, the aggregate evidence (shown in Figures 2 and 3) suggests that outsourcing to China grew slowly after the policy change in China, and began to grow rapidly only after 1986. Second, the differential amount of outsourcing across industries in Hong Kong is also consistent with a gradual adjustment story. More precisely, when we introduce a variable that interacts time with the change in outsourcing in the regressions shown in Table 5, the coefficient on the interactive variable of time and the labor share are always positive (and statistically significant). For example, the coefficient on a variable interacting time with the initial labor intensity in the specification shown in the fourth column in panel A (Table 5) is 20.07 (s.e.: 6.13).

TABLE 6—IV ESTIMATES OF RELATIONSHIP BETWEEN INDUSTRY OUTSOURCING AND RELATIVE DEMAND SHIFTS

	Dependent variable: $\ln(\text{nonproduction worker wage-bill share})$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Instrument = value-added share of labor (in 1976)								
Independent variable:								
$\ln[\text{imports}/(\text{shipments} + \text{imports})]$	0.3497 (0.1059) [0.54]	0.2934 (0.1178) [0.45]	0.2827 (0.1026) [0.44]	0.3280 (0.1166) [0.51]				
$\ln[\text{imported int. inputs}/(\text{shipments} + \text{imported int. inputs})]$					0.5274 (0.1798) [0.54]	0.4205 (0.1830) [0.43]	0.4034 (0.1546) [0.41]	0.4164 (0.1743) [0.42]
Overidentification Test (p -value)	0.96	0.96	0.95	0.98	0.98	0.94	0.93	0.94
Panel B: Instrument = wage bill share of nonproduction workers (in 1976)								
Independent variable:								
$\ln[\text{imports}/(\text{shipments} + \text{imports})]$	0.7838 (0.2405) [1.21]	1.2613 (0.6031) [1.95]	0.6599 (0.3130) [1.02]	1.0695 (0.4485) [1.65]				
$\ln[\text{imported int. inputs}/(\text{shipments} + \text{imported int. inputs})]$					1.0536 (0.2593) [1.07]	1.3729 (0.4999) [1.39]	0.7129 (0.2388) [0.72]	1.4634 (0.7867) [1.48]
Overidentification test (p -value)	0.94	0.93	0.98	0.96	0.96	0.95	0.99	0.95
Controls:								
$\ln(K/Y)$ and $\ln(Y)$ 1971–76 trends	No	Yes	Yes	Yes	No	Yes	Yes	Yes
World skill biased technical change	No	No	Yes	No	No	No	Yes	No
World skill biased technical change	No	No	No	Yes	No	No	No	Yes

Notes: Standard errors (clustered by industry) in parentheses. The observation is an industry-year period ($N = 54$). All regressions include time-period dummies. The brackets contain the share of a standard deviation of the dependent variable explained by a standard deviation increase in the independent variable. $\ln[\text{imports}/(\text{shipments} + \text{imports})]$ is change in share of imports from China as a fraction of imports from China and domestic shipments. $\ln[\text{imported int. inputs}/(\text{shipments} + \text{imported int. inputs})]$ is change in share of intermediate inputs imported from China. Control for 1971–76 trend is 1971–76 change in employment share of nonproduction worker in the industry. Controls for world skill biased technical change are worldwide rates of SBTC and change in wage-bill share of nonproduction workers in the United States. Overidentification test is the p -value of a regression of the residuals of the second-stage regression on the instrument.

intensity in 1976 is used to instrument the change in outsourcing, the IV estimates of β_1 do not differ that much from the OLS estimates. In addition, the IV estimates are always statistically significant. The instrument in panel B is the 1976 wage-bill share of nonproduction workers. As can be seen, the point estimates of the effect of outsourcing on skill upgrading continue to be positive and statistically significant. In addition, the IV estimates in this panel are uniformly higher compared to both the OLS estimates and the IV estimates that use the labor share to instrument for the differential impact of outsourcing across industries in Hong Kong.

In sum, the IV estimates provide additional evidence that China's opening had an important effect on relative demand shifts in Hong Kong's manufacturing sector. As with any instrument, however, these estimates have to be interpreted with caution because ultimately there is no way to know for sure whether the instruments are valid. It is comforting to note that both instruments easily pass a standard overidentification test, but it is well known that such tests typically have low power. Nonetheless, a comparison of the IV and OLS estimates still provides some useful information. If the OLS estimates are upwardly biased due to unobservable trends in skill

upgrading, the IV estimates should be smaller than the OLS estimates. To the extent that this is not the case, this provides further evidence that such trends are unlikely to contaminate the paper's central results.²¹

IV. Conclusion

This paper documents the extent of outsourcing from Hong Kong to China and the aggregate trends in relative wages and employment of skilled workers in Hong Kong over the last two decades. It finds evidence of strong and persistent relative demand shifts favoring skilled workers in Hong Kong since the early 1980s, which is when outsourcing to China started to take off. In addition, we find that roughly 15 percent of the aggregate relative demand shift is due to the reallocation of resources toward services related to outsourcing activities, and that roughly another 15 percent is due to the reallocation of low-skilled jobs within specific manufacturing industries. Finally, we show that the relative utilization of non-production workers has increased by more in the manufacturing industries that have shifted a larger share of their production to China.

There are a number of institutional features of Hong Kong's labor market that might explain why China's liberalization to foreign

trade and investment had such a large effect on Hong Kong's labor market.²² Only 16 percent of Hong Kong's labor force are union members, and most of these are government employees. Although union activities are legally protected, private sector companies are not required to engage in collective bargaining with labor unions. Labor market regulations are limited to provisions for maternity leave and severance pay. There is no minimum wage (except for foreign workers), unemployment benefits, or unfair dismissal law. Therefore, one should be careful in extrapolating from Hong Kong's experience. It is entirely possible that the labor market effect of a large outsourcing shock on a country where labor market institutions are more favorable to low-skilled workers would be quite different from what one sees in Hong Kong.

Finally, Hong Kong's experience follows the body of work by Feenstra and Hanson (1996, 1999) in highlighting the importance of outsourcing. There is a growing realization that outsourcing and trade in intermediate inputs may be just as important, if not even more important, than trade in final goods when thinking about the labor market effects of increased trade and globalization. There is a nascent body of theoretical work that captures this phenomenon. In addition, there are surely large gains from additional empirical work that examines the costs and benefits of outsourcing-related trade.

APPENDIX: DATA SOURCES

Our main data source is the micro-data from the Hong Kong Population Censuses. Specifically, we use the 1-percent sample of the 1971 and 1976 Hong Kong Censuses, the 5-percent sample of the 1981, 1991, and 1996 Censuses, and the 16-percent sample of the 1986 Census. We classify workers with the following occupations as non-production workers: manager, professional, technician, sales worker, and clerical worker; and workers with the following occupations as

²¹ A referee asked whether there might be changes in a firm's industry classification driven by outsourcing that would bias the results. For example, it might be the case that some skill-intensive firms decided to establish labor-intensive manufacturing plants in China after 1980. If such firms were reclassified as being in labor-intensive industries after 1980, then the skill intensity of such industries could increase simply because some skill-intensive firms are now classified as being in labor-intensive sectors. The ideal data to measure this effect would be a panel dataset of firms in Hong Kong. Even in the absence of such data, however, we can use indirect evidence to judge the likelihood of this scenario. For example, if the skill upgrading in labor-intensive sectors is driven by the entry of skill-intensive firms into the sector, this entry of high-skill firms should result in an *expansion* in these industries. There is clear evidence, however, that the labor-intensive industries that have been most affected by outsourcing to China are also ones that have experienced the largest *decline*, both as measured by their share of output and by their share of employees. For example, a regression of the change in the value-added share of an industry over successive five-year intervals from 1976 to 1996 on the change in outsourcing in the industry over the same time period yields -0.1064 (s.e.: 0.0247).

²² The facts in this paragraph are taken from Wing Suen and William Chan (1997, chap. 2).

production workers: craft worker, operators, service worker, and agricultural labor. We converted the educational classifications in the Hong Kong Census into years of education using the typical number of years necessary to complete a given level of education. The sample is restricted to employed people between the ages of 20 and 65. The wage is measured by the monthly income of main employment. The 1971 Population Census reports wages only in wide brackets, so we do not use this information.

The data on total intermediate inputs, investment, and value added for each sector are taken from the annual issues of the *Report on the Annual Survey of Industrial Production* from 1977 to 1996 and from the *1976 Census of Industry*. We deflate annual investment by the GDP deflator and used a perpetual inventory method to construct a series for the capital stock. Imports from China are from Statistics Canada's *World Trade Database* compiled by Robert Feenstra (<http://www.internationaldata.org>). The share of imported intermediate inputs from China is imputed as the product of imports from China and the share of imports in total purchases of intermediate inputs in each industry. The data shown in Figure 2 (reexports of Chinese origin, domestic exports, and non-Chinese reexports) are compiled from annual issues of Hong Kong's *Annual Review of External Trade*. Nominal GDP and the GDP deflator are from the annual issues of the *Hong Kong Annual Digest of Statistics*.

TABLE A.1—SUMMARY STATISTICS

	Mean	S.D.
dln(non-production worker wage-bill share)	1.83	1.69
dln[imports/(shipments + imports)]	1.41	2.61
dln[imported intermediate inputs/(shipments + imported intermediate inputs)]	0.77	1.72
dln(K/Y)	4.49	8.84
dln(Y)	0.70	7.96
dln(global skill-biased technical change)	3.47	4.95
dln(US nonproduction worker wage-bill share)	1.46	1.72
dln(nonproduction worker share, 1971–76)	0.61	2.69
1976 value-added share of labor	0.53	0.12
1976 wage-bill share of nonproduction workers	0.27	0.16

Notes: $N = 54$. All changes are average annual percentage growth rates.

REFERENCES

- Autor, David H.; Katz, Lawrence F. and Krueger, Alan B.** "Computing Inequality: Have Computers Changed the Labor Market?" *Quarterly Journal of Economics*, 1998, 113(4), pp. 1169–1213.
- Berger, Suzanne and Lester, Richard K., eds.** *Made by Hong Kong*. Hong Kong: Oxford University Press, 1997.
- Berman, Eli; Bound, John and Griliches, Zvi.** "Changes in the Demand for Skilled Labor within U.S. Manufacturing Industries: Evidence from the Annual Survey of Manufactures." *Quarterly Journal of Economics*, 1994, 109(2), pp. 367–97.
- Berman, Eli; Bound, John and Machin, Stephen.** "Implications of Skill-Biased Technological Change: International Evidence." *Quarterly Journal of Economics*, 1998, 113(4), pp. 1245–79.
- Bertrand, Marianne; Duflo, Esther and Mullainathan, Sendhil.** "How Much Should We Trust Differences-in-Differences Estimates?" *Quarterly Journal of Economics*, 2004, 119(1), pp. 249–75.
- Bound, John and Johnson, George.** "Changes in the Structure of Wages in the 1980s: An Evaluation of Alternative Explanations." *American Economic Review*, 1992, 82(3), pp. 371–92.
- Deardorff, Alan V.** "International Provision of Trade Services, Trade, and Fragmentation." *Review of International Economics*, 2001, 9(2), pp. 233–48.
- Dixit, Avinash K. and Grossman, Gene M.** "Trade and Protection with Multistage Production." *Review of Economic Studies*, 1982, 49(4), pp. 583–94.
- Enright, Michael; Scott, Edith and Dodwell, David.** *The Hong Kong advantage*. Hong Kong: Oxford University Press, 1997.
- Feenstra, Robert C.** "Integration of Trade and Disintegration of Production in the Global Economy." *Journal of Economic Perspectives*, 1998, 12(4), pp. 31–50.
- Feenstra, Robert C. and Hanson, Gordon H.** "Foreign Investment, Outsourcing, and Relative Wages," in Robert C. Feenstra, Gene M. Grossman, and Douglas A. Irwin, eds., *The political economy of trade policy: Papers in*

- honor of Jagdish Bhagwati*. Cambridge, MA: MIT Press, 1996, pp. 89–127.
- Feenstra, Robert C. and Hanson, Gordon H.** “The Impact of Outsourcing and High-Technology Capital on Wages: Estimates for the United States, 1979–1990.” *Quarterly Journal of Economics*, 1999, 114(3).
- Feenstra, Robert C. and Hanson, Gordon H.** “Intermediaries in Entrepôt Trade: Hong Kong Re-Exports of Chinese Goods.” *Journal of Economics and Management Strategy*, 2004, 13(1), pp. 3–35.
- Findlay, Ronald and Wellisz, Stanislaw.** “Five Small Open Economies: Hong Kong,” in Ronald Findlay and Stanislaw Wellisz, eds., *Five small open economies: World Bank comparative study*. New York: Oxford University Press, 1993, pp. 16–92.
- Hanson, Gordon H.; Mataloni, Raymond J. and Slaughter, Matthew J.** “Vertical Production Networks in Multinational Firms.” National Bureau of Economic Research, Inc., NBER Working Papers: No. 9723, 2003.
- Hong Kong Census and Statistics Department.** *1976 census of industry*. Hong Kong: Census and Statistics Department, 1976.
- Hong Kong Census and Statistics Department.** *Annual digest of statistics*. Hong Kong: Census and Statistics Department, annual issues.
- Hong Kong Census and Statistics Department.** *Annual review of external trade*. Hong Kong: Census and Statistics Department, annual issues.
- Hong Kong Census and Statistics Department.** *Report on the annual survey of industrial production*. Hong Kong: Census and Statistics Department, annual issues.
- Hummels, David; Ishii, Jun and Yi, Kei-Mu.** “The Nature and Growth of Vertical Specialization in World Trade.” *Journal of International Economics*, 2001, 54(1), pp. 75–96.
- Jones, Ronald W.** *Globalization and the theory of input trade*. Ohlin Lectures, Vol. 8. Cambridge, MA: MIT Press, 2000.
- Katz, Lawrence F. and Murphy, Kevin M.** “Changes in Relative Wages, 1963–1987: Supply and Demand Factors.” *Quarterly Journal of Economics*, 1992, 107(1), pp. 35–78.
- Kwok, Reginald and So, Alvin.** *The Hong-Kong Guangdong link: Partnership in flux*. Armonk, NY: M. E. Sharpe, 1995.
- Lawrence, Robert Z.** “Trade, Multinationals and Labour.” National Bureau of Economic Research, Inc., NBER Working Papers: No. 4836, 1994.
- Lee, Ching Kwan.** *Gender and the South China miracle: Two worlds of factory women*. Berkeley: University of California Press, 1998.
- Murphy, Kevin M. and Welch, Finis.** “The Structure of Wages.” *Quarterly Journal of Economics*, 1992, 107(1), pp. 285–326.
- Naughton, Barry, ed.** *The China circle: Economics and electronics in the PRC, Taiwan, and Hong Kong*. Washington, DC: Brookings Institution Press, 1997.
- Slaughter, Matthew J.** “Production Transfer within Multinational Enterprises and American Wages.” *Journal of International Economics*, 2000, 50(2), pp. 449–72.
- Suen, Wing and Chan, William.** *Labour market in a dynamic economy*. Hong Kong: City University of Hong Kong Press, 1997.
- Sung, Yun-Wing.** *The China–Hong Kong connection: The key to China’s open-door policy*. New York: Cambridge University Press, 1991.
- Sung, Yun-Wing.** *The fifth dragon: The emergence of the Pearl River delta*. Singapore: Addison Wesley, 1995.
- Zeile, William J.** “U.S. Intrafirm Trade in Goods.” *Survey of Current Business*, 1997, 77(2), pp. 23–38.