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Manufacturing Revolutions: Industrial Policy and Industrialization in South Korea*

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Abstract

I study the impact of industrial policy on industrial development by considering a canonical intervention. Following a political crisis, South Korea dramatically altered its development strategy with a sector-specific industrial policy: the Heavy and Chemical Industry (HCI) drive, 1973-1979. With newly assembled data, I use the sharp introduction and withdrawal of industrial policies to study the impacts of industrial policy—during and after the intervention period. I show (1) HCI promoted the expansion and dynamic comparative advantage of directly targeted industries. (2) Using variation in exposure to policies through the input-output network, I show HCI indirectly benefited downstream users of targeted intermediates. (3) I find direct and indirect benefits of HCI persisted even after the end of HCI, following the 1979 assassination of the president. These effects include the eventual development of directly targeted exporters and their downstream counterparts. Together, my findings suggest that the temporary drive shifted Korean manufacturing into more advanced markets and created durable industrial change. These findings clarify lessons drawn from South Korea and the East Asian growth miracle. *JEL: L5 O14 O25 N6. Keywords: industrial policy, East Asian miracle, economic history, industrial development, Heavy-Chemical Industry Drive, Heavy and Chemical Industry Drive.*

1 Introduction

Miracles by nature are mysterious. The forces behind the East Asian growth miracle are no exception. Industrial policy (IP) has defined Asia's striking postwar transformation (Rodrik 1995). The ambitious

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development strategies pursued across this region have shaped global industrial strategy, from Southeast Asia to Sub-Saharan Africa (Rodrik 2005; Robinson 2010; Lin 2012). With rare exception, every developing country has pursued some type of IP intervention. Early development economists argued that these strategies play a fundamental role in industrialization (Rosenstein-Rodan 1943; Hirschman 1958). Others argued IP is inherently deleterious (Baldwin 1969; Krueger 1990), and its role in East Asia was counterproductive (Pack 2000). While industrial policies have re-entered the broader policy arena, empirical evidence surrounding their failures and successes in the developing world is scant.[1] This holds for an episode associated with their use, the East Asian miracle.

South Korea embodied the transformation of East Asian economies. The economy entered the 1960s as an unstable industrial laggard. By the 1980s it had undergone a manufacturing transformation that had taken Western nations over a century to achieve (Nelson and Pack 1998).[2] How did South Korea transition from a light export economy to an industrial powerhouse?

I explore the role of industrial policy in Korea's transformation. By industrial policy, or IP, I mean something specific: deliberate state action intended to shift the composition of national economic activity (Lindbeck 1981; Chang 2003; Noland and Pack 2003). In developing countries, like South Korea in the 1980s, this shift is hoped to be growth enhancing. To study IP I turn to a key South Korean intervention that sought to change the industrial trajectory of the small, open economy.

The policy in question is South Korea's Heavy and Chemical Industry (HCI) drive, 1973 to 1979. HCI was a definitive postwar industrial strategy. In some dimensions, such as its emphasis on industry spillovers and capital accumulation, HCI shared similarities with early postwar policy-making (Rosenstein-Rodan 1943; Nurkse 1953). In other dimensions, it was synonymous with the East Asian miracle (Vogel 1991). Its outward orientation resembled policies pursued by contemporaries. HCI was itself inspired by Japan's earlier policy, and resembled contemporaries, like Taiwan (Cheng 1990, 2001). Korea's own industrial drive influenced strategies across the globe, as economies, such as Malaysia, "looked east" for developmental templates. The varied record of imitators, however, has fueled HCI's notoriety.[3] Among industrial policies, HCI looms large.

This study aims hopes to address some empirical issues surrounding industrial policy. Like many controversial East Asian policies—and infant industry policy broadly—evidence around its efficacy is incomplete (Lane 2020). This study confronts two challenges that complicate analysis of infant industry IP, in particular research design. Using newly assembled data, I also confront empirical obstacles to studying the East Asian miracle.

For over a century economists have discussed the empirical obstacles to studying industrial policy (Meredith 1906; Grubel 1966). Theoretically, most optimal policies are temporary, and justifications rely on assisting sectors with either dynamic comparative advantage (Greenwald and Stiglitz 2006) and (or) spillovers (for example, inter-industry linkages or across firm learning) (Hirschman 1958; Grossman 1990). Tests of theoretical justifications, however, are moot against many unobserved political realities surrounding IP (Rodrik 2005, 2012). These political confounders mean that IP often goes to sub-optimal and politically motivated recipients. These same political realities also mean that IP is seldom temporary (Juhasz 2018). Last, political confounders mean that *de jure* sectoral policy may not translate into *de facto* policy. For these reasons, I argue that the HCI context provides an important vehicle for studying the impact of industrial policy on industrial development.

I use variation introduced by South Korea's HCI episode to estimate the impact of purposeful IP on short-run, as well as persistent, Korean industrial development. I do so by using variation introduced by the HCI context.

[1] Recent contributions exceptions are discussed below. See Lane (2020) for review of the current empirical literature and policies.

[2] According to the Penn World Tables, in 1960 South Korea's *per capita* national income lagged behind Cameroon, the Central African Republic, Haiti, Madagascar, Morocco, Niger, and Tanzania (Werlin 1991; Feenstra, Inklaar, and Timmer 2015).

[3] For global experience of HCI-style policies, see Kim et al. (2013); Moreira (1994); Lall (1995); Lall (1996).

I argue that external politics precipitated HCI's start in 1973 and its termination in 1979. President Nixon's promise to withdraw U.S. forces from the Asia-Pacific area shook regional allies. Like Southern Vietnam, the Republic of Korea relied on U.S. support against Communist-backed North. Washington's about-face catalyzed South Korea to incubate a heavy industrial complex. Rigorously implemented under the duress of crisis, the drive targeted strategic, yet feasible, infant industries (Stern et al. 1995; B.-k. Kim and Vogel 2011). However, this drive was temporary. The assassination of the president in 1979 ended his regime's core project. I argue this variation is a useful natural experiment for estimating the impacts of IP on Korea's industrial development.

Studying the HCI experience entails constructing new data on industrial outcomes spanning South Korea's miracle period (1967-1986). I do so by harmonizing material from archival sources, digitized industrial surveys, and vintage machine-readable statistics into consistent panel data. Importantly, I combine industry-level data with digitized input-output accounts. The result is a data set spanning a key episode of East Asian development.

HCI's setting provides an estimation strategy. I study the impact of IP by comparing changes in outcomes between targeted versus non-targeted manufacturing industries each year, before and after, the HCI announcement. This dynamic differences-in-differences (DID) strategy captures the impacts of HCI policies (investment incentives and trade policy). Pre-trends represent Korea's counterfactual sectoral structure. Absent these interventions, industries would have evolved according to their pre-1973 pattern—or *static* comparative advantage. Post-1973 differences reveal the efficacy of IP in promoting sectors where South Korea had unrealized potential—or *latent* comparative advantage. I estimate these impacts using traditional two-way fixed effect (TWFE) estimators, as well new semiparametric estimation procedures (Callaway and Sant'Anna 2020; Sant'Anna and Zhao 2020).

My empirical strategy allows me to examine two principal justifications of industrial policy (See: Krueger and Tuncer 1982). First, by comparing the evolution of treated versus non-treated industries *after* Park's assassination, I confirm if that infant industry interventions were durable. In fact, I show some aspects of the drive only fully emerge after the policy drive. In doing so, I test for the dynamic impacts of IP. Second, another motivation for IP is that benefits accrue to industries external to treated sectors. I explore this by estimating the impact of IP on industries differentially exposed to targeted sectors through industrial linkages. With measures constructed from historical input-output accounts, I compare the evolution of (non-targeted) industries with weak links to industries with strong linkages to HCI sectors.

I highlight three findings. First, I show significant, positive impacts of IP across industrial development outcomes in targeted (treated) industries. Relative to pre-HCI levels, HCI industries expanded their output over 100 percent more than non-treated sectors; labor productivity is over 60 percent higher. I show the relative expansion of HCI industry does not result from a decline in non-treated industries. I find significant effects of IP on employment growth and export performance, and show output prices were 10 percent lower for HCI industry after 1973.

Second, the impact of HCI on industrial transformation is durable, and HCI promotes the long-run, dynamic comparative advantage of targeted export industry. Post-1979, industrial development outcomes—such as the *share* of economic activity—remained significantly higher compared to counterfactual industry. Moreover, HCI targeting is associated with the striking expansion of export industry. I estimate that HCI products were 13 percent more likely to achieve comparative advantage in global export markets after 1973. The revealed comparative advantage of HCI products increased 30 percent more than other manufacturing exports over the same period. Event study estimates show this ascent came to a head *after* the end of the policy. Hence, policies may have dynamic, long-run benefits beyond the planning period.

Third, HCI policies positively impacted the development of external, downstream industry, and promoted longer-run comparative advantage among downstream exporters. Downstream sectors with strong linkages to HCI industry expanded during the HCI period. During the drive, comparative advantage emerged among downstream exporters, yet the advantage fully materialized *after* 1979. Conversely, I show the backward-linkage effects of IP were, at best, limited. Thus, I find HCI supported development through supply-side effects passed through forward linkages. This comports with recent work on optimal interventions in networks by Liu (2019), who uses data from this paper to show that upstream sectors targeted by Korea correspond to sufficient statistics for industrial targeting.

Additionally, I show policies defy some characterizations of East Asian industrial policies and HCI. I do not find that HCI relied on strong, nominal trade barriers to protect output markets. Moreover, I do not find that HCI resembled import substitution (ISI) policies to which it has been compared. Rather, I find the HCI bundle likely operated through investment subsidies, promoting the capital formation and financing intermediates in targeted industry.

With these results I contribute to three literature. First, I build on nascent studies which use contemporary econometrics to study the efficacy of IP. This includes Nunn and Trefler (2010)'s work on structure of trade policy and industrial development, and recent country case-studies by Aghion et al. (2015) and Criscuolo et al. (2019). A complementary, parallel literature in empirical IO has begun articulating a structural framework for analyzing sector-specific policy bundles (see thoughtful work by Kalouptsidi (2018) and Barwick, Kalouptsidi, and Zahur (2019)).[4] In development, work by Rotemberg (2017) and Martin, Nataraj, and Harrison (2017) have explored issues at the heart of IP through the experience of Indian SME policy. Though industrial policy is ubiquitous in practice, the literature remains notoriously underdeveloped (Lane 2020).

I contribute to the empirical study of industrial policy through natural experiments and historical case studies. I join Juhasz (2018), who uses Napoleonic Blockade to test for infant industry policy in historical France. Related work by Inwood and Keay (2013) and Harris, Keay, and Lewis (2015) study the developmental effects of output market protection with Canada's early tariff experiments. Like this work, I find long-run effects of industrial policy, but in a contemporary setting and through contemporary export-oriented policies . These results dovetail with work studying dynamic comparative advantage and temporary natural experiments (Hanlon 2020; Mitrunen 2019; Pons-Benaiges 2017).[5] Thus, I join historical work highlighting the potential of transitory policy to promote the evolution of *"sunrise"* industry. I do so by examining a purposeful, targeted intervention in a modern context. In analyzing intentionally targeted policies, I speak to a growing body of work evaluating place-based IP, which uses variation introduced by institutional aspects of policy. Notably, Criscuolo et al. (2019), use exogenous variation to study the impact of IP support targeted at lagging (UK) geographies; and Becker, Egger, and Ehrlich (2010) for lagging EU industry. I show the impact of policies aimed at sunrise industries in a (former) developing country setting, rather than lagging regions.

Second, I contribute to unresolved debates on the role of industrial policy and development, specifically controversies around East Asian miracle. Influential qualitative work emphasized the role of IP in newly industrializing economies.[6] Wade (1990) and Amsden (1992) argue IP was vital to Taiwan's and South Korea's ascent. A sizable economics literature emphasized the implicit flaws of infant industry interventions (Baldwin 1969; Krueger 1990; Lal 1983).[7] Economists challenged the lessons gleaned from East Asia, specifically with respect to targeting (Weinstein 1995; El-Agraa 1997; Lawrence and Weinstein 1999). Krueger (1995) and Pack (2000)

[4]Kalouptsidi (2018) shows the potential to use theoretically-grounded inference to detect commonly unobserved industrial policies. This IO literature shares likeness with an the earlier "new trade" literature, which used calibration exercises to study the impacts of infantry industry interventions (Baldwin and Krugman 1988; Head 1994; Irwin 2000).

[5]Hanlon (2020) studies the initial cost advantages of early steel shipbuilders, while Mitrunen (2019) examines the impact of Stalin's export reparations policy on Finnish industry. For temporary government procurement policy, technology and managerial training, see Jaworski and Smyth (2018) and Giorcelli (2019).

[6]The qualitative literature is vast. See seminal work by Johnson (1982); Wade (1990); Vogel (1991); Amsden (1992); Evans (1995); Chibber (2002); and Kohli (2004)

[7]See: extensive critical discussions by Pack and Saggi (2006) and Noland and Pack (2003).

contend newly industrialized countries developed *despite* industrial strategy. Yoo (1990) argues HCI may have, in fact, harmed South Korea's export performance relative to contemporaries.

Correlation studies of East Asia have shown a negative relationship between interventions and industry development, and argue that IP did not target high-spillover sectors (Lee 1996; Beason and Weinstein 1996; Noland 2004).[8] My study parallels macro-theoretical contributions by Liu (2019); alongside his work, my results suggest that Korean targeting may not have been incoherent.My study is a first attempt to reconcile the debate in East Asia miracle with modern causal tools.

Third, I contribute to the discussion on the role of the state and development (Besley and Persson 2010, 2011; Dell, Lane, and Querubin 2018; Acemoglu et al. 2015)—especially their role in promoting industrial change (Kohli 2004). Using Vietnamese history as a case study, my work with Dell, Lane, and Querubin (2018) explores the effect of the Weberian state and its capacity to implement successful developmental policy in East versus Southeast Asia.

In sum, this study attempts to discipline a key episode of industrial policy with the toolbox of causal inference. The goal is to structure coherent insights around a key, historical case of industrial transformation. By doing so, I hope to extract coherent workings of the policy—those that are useful more broadly—and to emphasize a more empirically-grounded narrative around East Asian interventions.

I organize my study in the following way. First, section 2 discusses the institutional and historical setting of the HCI drive. Second, section 3 describes the data construction effort. Section 4 presents estimates of the direct impact of industrial policies on targeted industries. Section 5 turns to estimates of HCI's spillovers into external sectors via input-output linkages. Last, section 6 concludes with a discussion of these findings.

2 Institutional Context and Political Variation

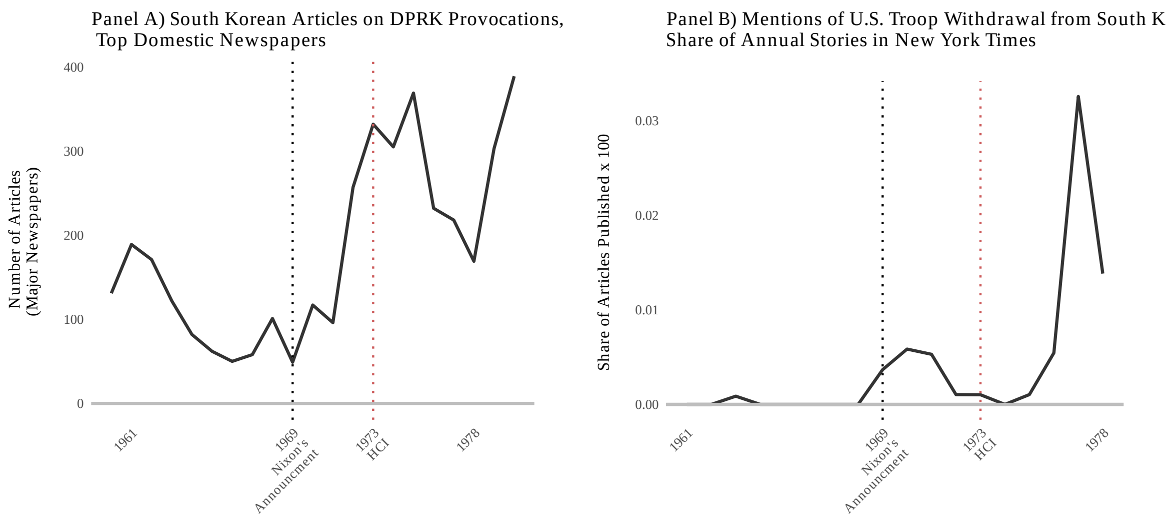
I use the historical and institutional details of South Korea's HCI drive, which I use to identify the impact of IP in the proceeding sections (section 4). I focus on three aspects of the context: first, the geopolitical crisis that shifted in Korea's development strategy and catalyzed HCI. Second, I detail the policy instruments that constituted the intervention. Last, I describe the withdrawal of these policies, following President Park's assassination in 1979.

A) External Political Drivers A political crisis propelled South Korea's HCI drive, which was fundamentally security driven.[9] Events in the late 1960s and early 1970s created a political impasse. The first, was a sharp change in U.S. foreign policy in Asia and North Korea's militarization (Kim 1997; Moon and Lee 2009). In 1969, President Nixon announced the end of direct U.S. military support for Asia-Pacific allies. This "Nixon Doctrine" effectively ended decades of large-scale military presence in the region. South Korea, an anti-Communist stalwart, was shocked. U.S. disengagement created the risk of full U.S. troop withdrawal from the Korean Peninsula (Nixon 1969; Kim 1970; Kwak 2003). Like their South Vietnamese allies, South Korea believed they would need to defend against a more militarized, Communist-backed neighbor. Further historical context for the nature of the "Nixon shock" is provided in the history section of the Online Appendix, including sources as to the surprise, shock-like nature of the intervention in historical literature.

[8] For Korea, Lee (1996) finds a negative relationship between postwar IP interventions and industry-level outcomes. Thoughtful work by Beason and Weinstein (1996) argues Japanese IP was not positively related to industry development, nor directed at sectors with scale economies. Noland (2004) similarly argues Korean policy did not target sectors with high spillovers (linkages).

[9] The security pretext of the policy is widely documented. "When President Richard M. Nixon declared his Guam Doctrine in 1969 to initiate U.S. military disengagement from Asia, Park's fear of the Americans' departure pushed him to initiate an aggressive HCI drive to develop a defense industry by 1973" (Moon and Jun 2011, 119). See H.-A. Kim (2011) for HCI and the evolution of defense industry.

Figure 1: Political Events Surrounding HCI - US Withdrawal and Korean Provocations



Notes: Figure shows the military−political crisis facing South Korea vis−a−vis U.S. and South Korean newspaper reporting. Panel A (left) shows the number of articles (count) in Donga and Kyunghyang newspapers matching a Korean−language dictionary of 'provocation' keywords (examples in text). I provide a list of Korean−language terms in the Online Appendix, which also details the selection of these terms using ‘‘‘word2vector‘‘‘−style models. The count includes articles matching dictionary terms that appear before page 5. The 'provocation' count in panel B matches the same count by Choi (1989) of DPRK actions violating the Korean War armistace, shown in Figure 1 of Online Appendix. Panel B (right) shows the share of New York Times news stories referring to troop withdrawal. Share is measured as the total number of full−text article hits divided by number of stories published (times 100). The search term used is 'South Korea+Troop Withdrawal', via The New York Times Lab API.

Figure 1 panel B plots coverage of U.S. troop withdrawal in the American press, measured as the share of New York Times articles containing “South Korea” and “troop withdrawal.” The first hump appears around 1970, corresponding to confirmation of American withdrawal from the peninsula. Crystallization of the withdrawal “profoundly” shocked the Park administration, who expected exemptions from Nixon’s doctrine [Trager (1972); Rogers (1970); Nixon (1970); Kwak (2003); p.34]. News attention grew through the 1971 pullout (24,000 troops, three air force battalions) from the peninsula which was seen as only the beginning of US demobilization. The second jump in panel Fig. 1 corresponds to the 1976 U.S. presidential campaign, and Jimmy Carter’s promise to end U.S. military assistance to Park. A critic of Korea’s human rights record, Carter reaffirmed his commitment after his election (Han 1978; Taylor, Smith, and Mazarr 1990; Lee 2011).[10]

Shifts in U.S. foreign policy came at a critical juncture for South Korea. The threat of withdrawal coincided with the militarization of North Korea and renewed provocations (Ostermann and Person 2011). Panel A of Figure 1 reports increasing antagonism by North Korea surrounding Nixon’s announcement, as reported by South Korean media. Using the full-text archive of large Korean newspapers, *Dong-A Ilbo* and *Kyunghyang Shinmun*, panel A plots the number of articles reporting on North Korean provocations. This count is constructed using a dictionary of Korean-language keywords for military antagonism (*e.g.* `도발(provocation), 교전(engagement), 남침(invasion of the South), 침투(infiltration), 폭파(explosion), 포격(shelling)`). The construction of this dictionary—using seed terms along with a `word2vec`-style model—is described in the Online Appendix. Importantly, the trends shown in panel A align with hand-collected data on military altercations by Choi and Lee (1989), shown in Figure 1 of the Online Appendix.[11]

[10]HCI’s pretext was “magnified by the Carter administration’s plan to completely withdraw U.S. ground forces.” (Kim, Shim, and Kim 1995, 186). Park’s eventual assassination complicated Carter’s commitment.

[11]Older versions of the paper used this data, but I turned to NLP tools since North Korea’s escalation looked quite extreme. Nevertheless, both charts supported one another.

Panel A conveys the wave of attacks launched by the DPRK following Nixon's announcement, and the rising tensions before the HCI announcement in 1973. Starting in the late 1960s, South Korea experienced a string of high-profile security emergencies (Scobell and Sanford 2007).[12] In the early 1970s the DPRK rivaled the South militarily. The North emerged from the Korean War with an industrial advantage, and since the 1960s pursued a total military-industrialization campaign (Hamm 1999). Relying on U.S. military support, South Korea had not done the same. During the events shown in Figure 1, South Korea had no domestic arms industry, nor the scale of industry to support it. Without U.S. troops, South Korea relied on vintage arms, and stocks incapable of absorbing a DPRK blitz (Cushman 1979; Eberstadt 1999).

These military-industrial deficiencies drove HCI policy, both in the timing and sectoral scope of policy, which I turn to now.

B) Sectoral Choice The HCI drive was announced on January 12, 1973, after a period of covert planning.[13]. The HCI plan is often conflated with Korea's Third Five Year Economic Development Plan (1972-1976), which the HCI announcement effectively interrupted (Lee 1991). Using investment incentives and trade policy, HCI targeted six broad classes of strategic industry: steel, non-ferrous metals, shipbuilding, machinery, electronics, and petrochemicals (*ibid*; Stern et al. 1995). Table A2 lists translated names for harmonized 5-digit industries that fell under HCI priority sectors.

Two concerns dominated the choice of industry. First, HCI sectors were necessary if South Korea was to pursue military-industrial modernization, in anticipation of a future without U.S. military presence (Woo-Cumings 1998; H.-A. Kim 2011). Upstream heavy industries were the linchpin. For the Park regime, inputs like steel embodied one such critical industry (Rhyu and Lew 2011). Before 1973, the economy lacked inputs to develop a military-industrial base comparable to North Korea, which was endowed with heavy industry and pursued Communist-supported militarization. Early forays into arms manufacturing in the South were unsuccessful, with "inadequate materials and the lack of precision production. Koreans realized the critical importance of creating a more advanced industrial base" [Horikane (2005); p.375].

Second, crisis compelled Korea to choose wisely. Technocratic planning limited IP to a set of viable target sectors, and HCI planners used feasibility studies to winnow the scope of policies (Stern et al. 1995).[14] In doing so, the regime carefully studied the industrial strategies of other small open economies (Perkins 2013). Further historical details on Korea's technocratic planning are also provided in the History section of the Online Appendix.

Korea attempted to choose sectors for which it had a latent comparative advantage. To this end, planners saw the economy as akin to Japan—lagged. In fact, Japan's experience was less a metaphor than a blueprint. For instance, the New Long-Range Economic Plan of Japan (1958–68) was one such technocratic blueprint, and Japan's experience gave South Korea a template of sectors for which they had potential (Kong 2000; Moon and Jun 2011).[15]

C) HCI Policy Levers and Temporal Variation The HCI drive was a shift in South Korean economic policy, from generalist to targeted. Before 1973, Korea pursued a broad, export promotion development strategy

[12]By 1971, U.S. officials warned "our front-line is a half step before crisis" [Kim (2001); p.55].

[13]See extensive treatments by Horikane (2005) and H.-A. Kim (2011)

[14]Jet engines and missiles, for example, were rejected as beyond their capability. For South Korea's planning bureaucracy, see Adelman (1969). "Planning" here refers to indicative (not central) planning inspired by France, West Germany, and Japan.

[15]Beyond steel and metals, shipbuilding is an example of using Japan to justify sectoral choice. "Korea found in Japan's shipbuilding industry a cynosure" argues Woo (1991), were "the Korean strategy to promote shipbuilding was very simply a carbon copy of Japan's" (p.137). Government documents from 1973 "dutifully note Japan's export performance in 1955-71 and its composition of manufactures" [Kim and Leipziger (1993); p.18-19].

(Krueger 1979; Westphal and Kim 1982; Westphal 1990).[16] The HCI-era, in contrast, was decidedly industry specific and surgical.

These surgical policies can be summarized in two broad categories: investment and production-type incentives, and trade policy. Investment incentives were a critical policy ingredient, notably credit for inputs and capital formation (see: Woo 1991). Starting in 1974, the National Investment Fund (NIF) promoted long-term investment with subsidized loans to HCI sectors (Koo 1984; Kim 2005).[17] These "policy-oriented" loans were lent through commercial banks and state-run development banks (Koo 1984).

Figure (left) A1 shows the pattern—and volume—of lending by a key NIF lender, the Korea Development Bank (KDB), before and during HCI. The plot shows the differential pattern of lending between sectors (2-digit level). Targeted sectors are shown in red. Non-targeted are shown in black. KDB-NIF lending in Figure (left) A1 is only representative of the trend in lending however. A great deal of which was still done through the commercial banking system, which, by the HCI period, had come under various forms of state control. The line "between commercial and specialized banks [like those in Fig. A1] became blurred and both served as instruments" for government directed credit [Cho (1989); p.93].

The right panel of Figure A1 provides another view of incentives over the HCI period, and conveys differences in the cost of capital across sectors. Specifically, the right panel plots estimates of effective tax rates on the returns to capital, accounting for the package of industry-specific subsidies through the HCI drive (calculated by Kwack 1985; Stern et al. 1995). Thick lines show average rates in HCI versus non-HCI sectors. Thin lines are average rates disaggregated at the 2-digit industry level. Post-1973, the rates across industries diverge markedly, reflecting the HCI drive's sectoral bias (Kwack 1984; Kim 1990).[18]

Second, trade policy shifted from general export promotion to HCI promotion. Pre-1973, exporters enjoyed a "virtual free trade regime" and were exempted from a number of import restrictions on inputs (Nam 1980; Westphal 1990). HCI ended this early program, eliminating the allowances and import subsidies granted, broadly, to exporters. Post-1973, however, HCI industries enjoyed 1960s-style import assistance and exemptions (Woo 1991; Cho and Kim 1995). For example, HCI producers were exempted from up to 100 percent of duties and tariffs on imports.[19]

HCI had an unexpected expiration date. On October 26, 1979, President Park was assassinated by Korean Central Intelligence Agency director, Kim Jae-kyu. The assassination ended Park's regime and its keystone industrial drive (Cho and Kim 1995; Lee 1980). The successor regime rejected the *dirigisme* of the Park era and rationalized HCI policy in repeated rounds of economic liberalization.[20]

Thus, post-1979, South Korea dismantled HCI incentives, pursuing "investment adjustment" for targeted sectors and further trade liberalization (Kim 1988, 1994; Kim and Leipziger 1993). The import liberalization ratio climbed from 68.6 in 1979 to 76.6 by 1982, and restrictions were further reductions between 1982 and

[16] Conditional on manufacturing, this policy was broad. As these export incentives "were administered uniformly across all industries" [Westphal and Kim (1982); p.217-218]. For example, the main role of credit policies "was to support export 'activity' rather than specific industries" [Cho (1989); p.93].

[17] The NIF was largely funded through bond sales of financial institutions. According to Byung-kook Kim, "NIF was an outright forced savings program," selling bonds on public non-banking institutions and then requiring 8 percent of wage income to be levied into pensions [B.-k. Kim and Vogel (2011); p.226].

[18] Previous export tax incentives "no longer played a central role compared to that played by [the] industry incentive scheme," which directed investment to "a relatively small number of industries" [Trela and Whalley (1990); p.19]. "Special Tax Treatment for Key Industries" under the *Tax Exemption and Reduction Control Law* was one such example of HCI investment incentives.

[19] According to Park (1977)'s calculation for the period "key industries," on average, enjoyed 80 percent tariff exemptions across industries (with the exception of petrochemicals) (p.212). Meanwhile, HCI exporters were allowed to purchase inputs from foreign investors and licensors (Castley (1997)).

[20] HCI was not without its cracks. Earlier in 1979, the government had announced the "Comprehensive Stabilization Program," in efforts to address the apparent macroeconomic instability brought on by turbulent world economic conditions and exacerbated by HCI lending. Nevertheless, Park's removal meant wide scale retrenchment of HCI in earnest.

1984. The banking sector was also liberalized, with notable reforms in 1981 and again in 1983. The share of government "policy loans" to industry shrank, and interest rates between strategic and non-strategic sectors converged (Cho and Cole 1986; Nam 1992). By 1982, the gap in effective corporate tax rates between strategic and non-strategic industries was also closed (Kwack and Lee 1992) (reported in A1).

3 Data Construction

I construct new data on industrial development over South Korea's miracle period (1967-1986). Below I describe the construction and harmonization of this data. Since, however, harmonization required nearly a dozen crosswalk schemas, I provide additional technical details in the data section of the Online Appendix.

Table A1 shows pre-1973 statistics (mean and standard deviation) for core variables. For visibility, A1 mostly reports non-normalized values. Throughout this paper, however, I default to inverse hyperbolic sine (*ihs* throughout) normalization, which accommodates 0s and negative values. Variables, such as disaggregated investment data, contain zeros, and inventories contain both zeros and negative values. This is especially prescient in higher resolution industrial panels.

The Long and Short of Industrial Panels The empirical strategy of this paper requires following industries consistently through time. I construct industry-level panels using digitized data from the Economic Planning Board's (EPB) Mining and Manufacturing Surveys and Census (MMS). True to its name, the HCI drive was a fundamentally industry-level intervention. To this end, MMS industry data is apt for studying sectoral policy. It is high quality; reports manufacturing outcomes across the study period; and importantly, it is available at a fine level of disaggregation.

The MMS published census data nearly every five years (1970, onward, with annual intercensal surveys) at the 5-digit industry level, and aggregated from establishment-level enumeration.[21] I supplement digitized MMS statistics with vintage MMS tape data (1977–1986) sold by the EPB in the 1980s. Additional data on prices are digitized from historical and contemporary Bank of Korea producer price index publications.

Creating consistent industry panels is non-trivial. Specifically, following industries through the HCI period (and beyond) requires extensive concordance and harmonization. Between 1967-1986, the horizon of this study, the EPB updated Korea's industrial codes (KSIC, based on the international ISIC standard) four times, with a major revision in 1970.

Thus, I use two harmonized panels throughout this study, which are shown in Table A1. Part A of Table A1 reports values from the shorter, granular 5-digit industry panel, which is harmonized from 1970 to 1986. Part B reports values from the longer, but much more aggregated, 4-digit panel. This data is harmonized from 1967 to 1986. I choose 1986 as the end date of the panel, as it is when my mainframe data series ends and it is the year before the disrupting transition to democracy in 1987.

The harmonization process accounts for industry code changes in official Korea manufacturing data and introduces a trade-off.[22] On the one hand, shorter panel data (1970-1986) accommodates more industry observations, but does so over a smaller period. Thus, 5-digit data requires less harmonization as it is closer to original MMS values. On the other hand, longer data (1967-1986) covers fewer industries, but does so over a longer period. Thus, 4-digit data requires more harmonization (thus aggregation), but encompasses critical pre-HCI periods.

[21] To illustrate this level of aggregation consider two sectors: 35291, *Manufactures of adhesives and gelatin products*, and 35292, *Manufactures of explosives and pyrotechnic products*. Note that because the census is enumerated at the establishment-level, as opposed to the firm, this precludes analysis of firm competition. Micro data is not readily available for this early period.

[22] Fundamentally, this harmonization process entailed digitizing and rebuilding official crosswalks. I provide details of the process in Data Appendix.

Linkage and Trade Data Data on sectoral linkages come from the Bank of Korea's 1970 "basic" input-output tables. These are the most disaggregated available for the period, and cover around 320 sectors. Hard copies were translated to English and then digitized.[23] I also construct Leontief input-output coefficients from 1970 tables, which I describe in section 5.1.

Bank of Korea data and MMS industrial surveys use different coding schemes. This means that combining input-output accounts with industry data requires further harmonization. The Online Data Appendix describes this process, along with other harmonization and cross-walk procedures required by my analysis.

I supplement the 1970 input-output tables with 1975 tables. Though produced during the HCI drive, the 1975 tables distinguish between domestic and imported intra-industry flows. I return to this distinction in the network analysis section 5.1. Throughout the study, I default to referring to the "general" 1970 linkages, unless otherwise specified.

I use international trade flow and trade policy data as a standalone panel. This trade panel is also mapped to the "long", 4-digit industrial panels described above. Trade flows come principally from the UN-COMTRADE database and are originally reported at the 4-digit SITC (Rev.1) level. Thus, I also construct crosswalks to connect trade-level data to Korean industrial data.

Trade policy—product-level measures of quantitative restriction (QRs) coverage and tariffs—are digitized from Luedde-Neurath (1986) (at the Customs Commodity Code Number [CCCN] level). This data is available for 1968, 1974, 1976, 1978, 1980, and 1982. This is the most disaggregated, readily-available data for the period (Westphal 1990). Moreover, these statistics are notable in that they contain measures of core non-tariff barriers, notably quantitative restrictions (QRs) (Goldberg and Pavcnik 2016).[24]

I use trade policy data to calculate separate measures of output and input market protection.[25] Output protection for industry i is simply the average tariff or QR score for that sector: output-tariff$_i$. HCI used exemptions from import barriers as a policy tool. Thus I calculate measures of input protection. Input tariffs faced by i (or QRs) are calculated as the weighted sum of tariff (QR) exposure, with weights taken from the 1970 I-O accounts (following Amiti and Konings 2007). As such, exposure is calculated as input-tariff$_i = \sum_j \alpha_{ji} \times$ output-tariff$_j$, where α_{ji} are input cost-shares for industry i.

I now consider how the HCI industrial policy bundle might propagate through the input-output network.

4 Direct Impacts of Industrial Policy

4.1 Empirical Framework

This section explores how HCI industrial policy impacted the evolution of targeted industry—during and after the policy period. I use this variation to estimate the impact of HCI industrial policy. This section describes how. First, I describe how the HCI context is useful in estimating the impact of industrial policy. Second, I show how this variation informs a differences-in-differences estimation strategy.

Empirical Import of HCI Variation The HCI episode sharply altered the sectoral bias of Korean industrial strategy, while its introduction and withdrawal were driven by external political forces. From an empirical point of view, the context of the HCI is a useful experiment for estimating the impact of industrial policy.

[23] At the time of this study, machine readable I-O tables for 1970, were not available from the Bank of Korea. Note that 1970 tables report *total* values of inter-industry flows and do not differentiate between domestic and imported activity.

[24] Archival administrative data has been collected as of this study. Most empirical studies of Korean trade policy use highly aggregated data. I describe Luedde-Neurath (1986)'s coding of QRs in the Data Appendix.

[25] For simplicity, this study follows the contemporary practice of using nominal, statutory measures, though I also calculate measures weighted by input share for the corresponding year.

First, in practice industrial policy is often negatively correlated with industry fundamentals. Clientelism and capture mean policies go to industries that contradict comparative advantage (Rodrik 2005; Lin 2012). Yet beyond rent-seeking, it is common for IP to support stagnating industries ("sunset" IP as opposed to infant industry IP).[26]. While sunset policies or industry support are often driven by political demand, they may also be socially optimal (Hillman 1982; Flam, Persson, and Svensson 1983). Given this policy orientation, empirical work often shows a negative relationship between IP and industrial development outcomes (Harrison 1994; Harrison and Rodriguez-Clare 2009; Rodriguez and Rodrik 2001).

HCI, however, is an infant industry policy aimed at sectors for which South Korea has unrealized—or latent—comparative advantage. Critically, the HCI episode distinguishes between sunrise and sunset policies.[27] Similarly, HCI was a top-down shift in national industrial strategy, whose sectoral bias was not driven by political constituencies. President Park's consolidation of power allowed the creation of a technocratic Heavy and Chemical Industry Planning Board that transcended competing state factions.

Second, the external politics of HCI meant that *de jure* policy was binding. In practice, industrial policy pronouncements often depart from actual implementation. Even where policy is coherent and deployed, political constraints can undermine the quality of administration. Subsidized credit may not be directed toward prioritized industry (Lazzarini et al. 2015; Musacchio, Lazzarini, and Aguilera 2015), and trade policies may be undermined by capacity constraints (Panchamukhi 1978). Thus, regressing outcomes of statutory IP measures may not reveal the impact of policy, but the quality of implementation. The politics behind HCI, however, meant policy was incentive compatible. Expedient political factors made HCI binding—both its implementation and removal.

Third, the HCI drive (1973-1979) was temporary. The theoretical case for infant industry policy often involves *temporary* policy (Melitz 2005). Historically, however, temporary policies often become permanent (Juhasz 2018), complicating empirical tests. For HCI, the 1979 assassination of President Park effectively ended HCI. I use the post-1979 period to examine the long-run impacts of the policy.

Fourth, HCI was a purposeful shift in national industrial policy toward a discrete set of infant industries. Given the complications of estimating the impact of IP, researchers have used valuable natural experiments that mimic policy variation (*e.g.* Juhasz (2018) and Hanlon (2020)). Broadly, however, the case for IP hinges on policy being allocated intentionally—according to technocratic criteria. This rationale can make it difficult to glean insights from random variation that does not embody this criteria (Rodrik 2004).[28] The HCI episode provides useful temporal and sectoral variation for studying industrial policy "in the wild."

The HCI episode thus provides a useful setting to estimate the short and longer run impacts of industrial policy. HCI industries selected were nascent industries, as opposed to sunset industries. The geopolitical crisis meant IP was purposeful; planned in secret; and implemented, top-down, by a government, limiting the scope of domestic lobbying. A planning apparatus reduced—intentionally so—the potential of choosing sectors that contradicted notions of comparative advantage.

Estimation The temporal and sectoral variation of HCI informs a natural differences-in-differences style strategy. I use the January 1973 announcement of HCI as the start date, and 1979 as the *de facto* end date of HCI. The end date corresponds to President Park's assassination, which promulgated the repeal of IP incentives by the successor regime.

[26] Such policies may be permissible under multilateral agreements.

[27] For example, while Korea's HCI supported a "sunrise" shipbuilding industry, their Swedish contemporaries supported a "sunset" shipbuilding industry.

[28] Criscuolo et al. (2019) and Giorcelli (2019) illustrate the possibilities of using random variation in ways that, nevertheless, address these issues.

Using a dynamic differences-in-differences design, I estimate the differences between targeted HCI industries and non-targeted manufacturing industries, each year relative to 1972. I examine these differences, before, during, and after the policy. Formally, I estimate the following

$$Y_{it} = \alpha_i + \tau_t + \sum_{j \neq 1972} \beta_j \cdot \left(\text{Targeted}_i \times \text{Year}_t^j\right) + \sum_{j \neq 1972} X_i' \times \text{Year}_t^j \Omega_j + \epsilon_{it} \tag{1}$$

i indexes each 5-digit or 4-digit manufacturing industry, and t denotes the year. For the long 4-digit panel, t takes the values 1967 – 1986, and 1970 – 1986 for the more granulate 5-digit panel. Outcome Y is an industrial development outcome. For industrial data (see section 3) I will make ample use of the inverse hyperbolic sine transformation (*ihs*) for outcomes.

The main effects of the policy are estimated using the term, *Targeted*, a binary variable equal to if HCI targets an industry, and zero otherwise. This "sharp" treatment term has a number of benefits. First, this simple indicator allows me to visually assess counterfactual industry dynamics, by clearly plotting pre-trends and group averages (see results section Figure 2). Second, it allows clearer comparisons with the semi-parametric estimators described below, which require binary treatment. Third, binary treatment easily codifies HCI targeting for industries that fall under the drive's list of key strategic industries.

The baseline equation (1) is a linear two-way fixed effects (TWFE) specification. Industry fixed effects, α_i, mean that I use variation within each industry. Time effects, τ_t, control for common temporal shocks. Standard errors are corrected for heteroskedasticity and clustered at the industry-level, allowing for within-industry correlation.

I include a set of baseline pre-treatment controls which attempt to capture unobserved productivity correlated with the intervention. These include measures of total material costs, average wage bill, average plant size, and labor productivity. Since these averages do not change through time, I interact them with period effects, $X_i' \times \text{Year}$. Thus, their effect is allowed to flexibly vary through time.

The coefficients of interest, β_j, describe the evolution of manufacturing industries through time. The set of these β_js are the differences between targeted and non-targeted industries for each year j, relative to the pre-treatment year 1972, with the coefficient for 1972 normalized to 0.

The set of β_j convey three aspects of how HCI industries evolved between 1967 and 1986.

First, estimates after 1972 show the average impact of the policy package for each period after the start of HCI. If HCI is associated with short-run (that is, during the six year drive) industrial development, we should observe increasing differences in Y between 1973 and 1979: $j \geq 1973$, $\hat{\beta}_{1974} \leq \hat{\beta}_{1975} \leq ... \leq \hat{\beta}_{1979}$.

Second, estimates after 1979 describe the more durable, long-run impacts of the temporary infant industry policy. In the parlance of the IP literature, the longevity of these effects indicate the potential "dynamic effects" of IP. Be they through dynamic scales economies, forms of learning-by-doing, or other forces that transform temporary advantages into persistent effects. For $j > 1979$, estimates $\hat{\beta}_{1979} \leq \hat{\beta}_{1980} ... \leq \hat{\beta}_{1986}$, would be compatible with a more persistent, or dynamic impact of the policy.

Third, estimates before 1972 describe average differences between HCI and non-HCI industry before the policy. Thus, they convey information—with caveats—for the common trend assumption of the research design. Pre-1972, we should not observe systematic differences between treatment and control industries:

$\hat{\beta}_{1967} \approx \hat{\beta}_{1968} \approx \hat{\beta}_{1972} \approx 0$. Thus, I provide joint tests for whether β_j are not equal to 0 over the pre-treatment period.[29]

Accordingly, the identifying assumption behind equation (1) is that differences in industrial development between treated and non-treated industries would have evolved similarly in the absence of the policy. I assume the comparative advantage of HCI industries was latent, and thus had not materialized—and may not have, absent the HCI policy bundle.

Although pre-treatment movements in targeted sectors is helpful to this end, the analysis in the second part of this paper may also be useful (section 5.3.2). Movements—or lack thereof—in industries downstream or upstream from targeted sectors can potentially reveal aspects of the pre-1973 HCI environment that may not be directly observable in HCI sectors themselves. Movements in external sectors—upstream or downstream—may be informative as to supply-side or demand-side trends that may confound estimates of HCI's impact over the period.

Thus far, I have focused on the impacts of HCI for each point in time. Yet, it is useful to consider the *average* impact of HCI an either side of the intervention—before and after 1973. Consider a simplified specification,

$$Y_{it} = \alpha_i + \tau_t + \beta \cdot \left(\text{Targeted}_i \times \text{Post}_t\right) + \sum_{j \neq 1972} X_i' \times \text{Year}_t^j \Omega_j + \epsilon_{it}. \tag{2}$$

where the binary treatment variable Targeted_i is now interacted with a simple binary Post_t indicator (zero before 1973, one after).[30] This interaction is the core difference between (2) and the dynamic specification (1). Thus, (1) estimates one β, the average impact of HCI before and after 1973.

Nevertheless, empirical issues can complicate interpreting β as the average total impact of the HCI bundle. An emerging literature has documented why such linear estimates may be sensitive to a number of assumptions, such as heterogeneity of treatment and dynamic impacts of policy (Sloczynski 2018). In my setting, the impact of IP may vary through time. Similarly, the common trend assumption may hold *only* after conditioning on covariates (Callaway and Sant'Anna 2020). Both factors can complicate direct interpretations of the total average effect of policy.

The potential shortcomings of linear estimators motivate an alternative means of estimating the average impact of HCI, which I turn to now.

Semiparametric DID Estimation and Average Treatment Effects on the Treated I consider a semiparametric version of the linear DID estimator above. Specifically, the doubly-robust DID estimator of Sant'Anna and Zhao (2020), adapted for a multiple-period setting by Callaway and Sant'Anna (2020). Among its advantages, this method relaxes constraints of linear TWFE estimators, and recovers an interpretable *overall* average treatment effect on treated units, or *ATT*.

Thus, in addition to the linear DID methods above (eq. (2) and (1)), I estimate the impact of HCI for each period using the following equation,

[29] Neither individual or joint significance tests are conclusive. Although null results provide information about DID pretrends assumptions, they cannot, alone, verify the pre-trend assumption. This may be true, in particular, for the "detailed" 5-digit estimates for my study, which have limited pre-treatment periods.

[30] Like Targeted, the separate Post is subsumed by the period effects τ_t.

$$\text{ATT}_t = \mathbf{E}\left[\frac{\text{Targeted}}{\mathbf{E}\left[\text{Targeted}\right]} - \frac{\frac{\pi(X)(1-\text{Targeted})}{1-\pi(X)}}{\mathbf{E}\left[\frac{\pi(X)(1-\text{Targeted})}{1-\pi(X)}\right]}\right](Y_t - Y_{1972}) - f_{0,Y_t - Y_{1972}}(X) \tag{3}$$

where (3) is the weighted average differences in industry outcomes. More precisely, (3) is the difference in outcomes between targeted industries (Targeted) and non-targeted industries (1 − Targeted).

Weights in (3) are defined as follows (following Sant'Anna and Zhao (2020) and Callaway and Sant'Anna (2020)). The term $\pi(X) \equiv \mathbf{E}[\text{Targeted} \mid X]$ is the propensity score for treated industries. The term $f_{0,Y_t-Y_{1972}}(X) \equiv \mathbf{E}[Y_t - Y_{1972}|\text{Targeted=0,X}]$ is a regression for the change in outcomes for non-treated industries, between post-period t and the baseline, pre-treatment period, $t = 1972$. Propensity scores $\pi(X)$ and regression $f_{0,Y_t-Y_{1972}}(X)$ are estimated by logit and OLS, respectively.

The estimator is *doubly-robust* in the sense that if either component is correctly specified, then (3) is a consistent estimate of the average treatment effect on the treated, or ATT. Confidence intervals for (3) are calculated using a bootstrap procedure, and allow for autocorrelation and industry-level clustering (Callaway and Sant'Anna 2020).

Beyond recovering a coherent ATT, the semiparametric method is useful for the HCI context. The two-step procedure relaxes the functional-form assumptions for the evolution of potential outcomes. The doubly-robust re-weighting estimation procedure ensures balance between targeted and non-targeted industries. Last, the pre-trend assumptions are also less stringent than other estimators. Average effects in (3) do not rely on zero pre-trends over *all* pre-treatment periods, and instead use a long-difference (between post-period t and the latest pre-treatment period, 1972).

The results in section 4.2 show that patterns estimated by linear TWFE estimation are robust to the semiparametric procedure. The following empirical analysis relies on a dynamic DID analysis. For familiarity, I default to presenting linear TWFE results (1) first, and then show the corresponding dynamic semiparametric estimates from (3) for core specifications. In addition, I report the *average* impact of policy pre-post DID estimates. I show OLS estimates alongside estimates of the aggregate semiparametric DID estimates, and the latter are preferred. Note (3) requires a binary treatment and is not used for cases of continuous treatment. This includes the later network analysis in section 5.

4.2 Direct Impacts - HCI Industrial Policy and Industrial Development

This section examines the evolution of treated (HCI) versus and non-treated (non-HCI) industries, before, during, and after the HCI drive. I do so in four steps. First, A) establishes the core impact of HCI on industrial growth and the expansion of real output. Next, part B) moves beyond growth and shows the relationship across a set of industrial outcomes. Importantly, C) focuses specifically on the relationship between HCI and longer-run trade performance, in particular, the dynamic comparative advantage of HCI exporters. Last, in part D) I use a doubly-robust semiparametric procedure to report the overall average impact of HCI policies (ATT), and show that linear estimates are robust to less parametric assumptions.

A) HCI and Output Expansion Figure 2 plots dynamic DID estimates for the impact of HCI on output, measured as real value shipped. Coefficient estimates from (1) are plotted in black, and 95 percent confidence bands are shown in gray. Panel A shows estimates for the detailed ("short") 5-digit panel, which starts in 1970. Panel B shows estimates for the more aggregated ("long") 4-digit panel, which start in 1967. Columns show specifications including baseline fixed effects (right) and those with additional controls (left).

Figure 2: Differences in Industrial Growth (Real Value Shipped), HCI vs. Non-HCI Industry

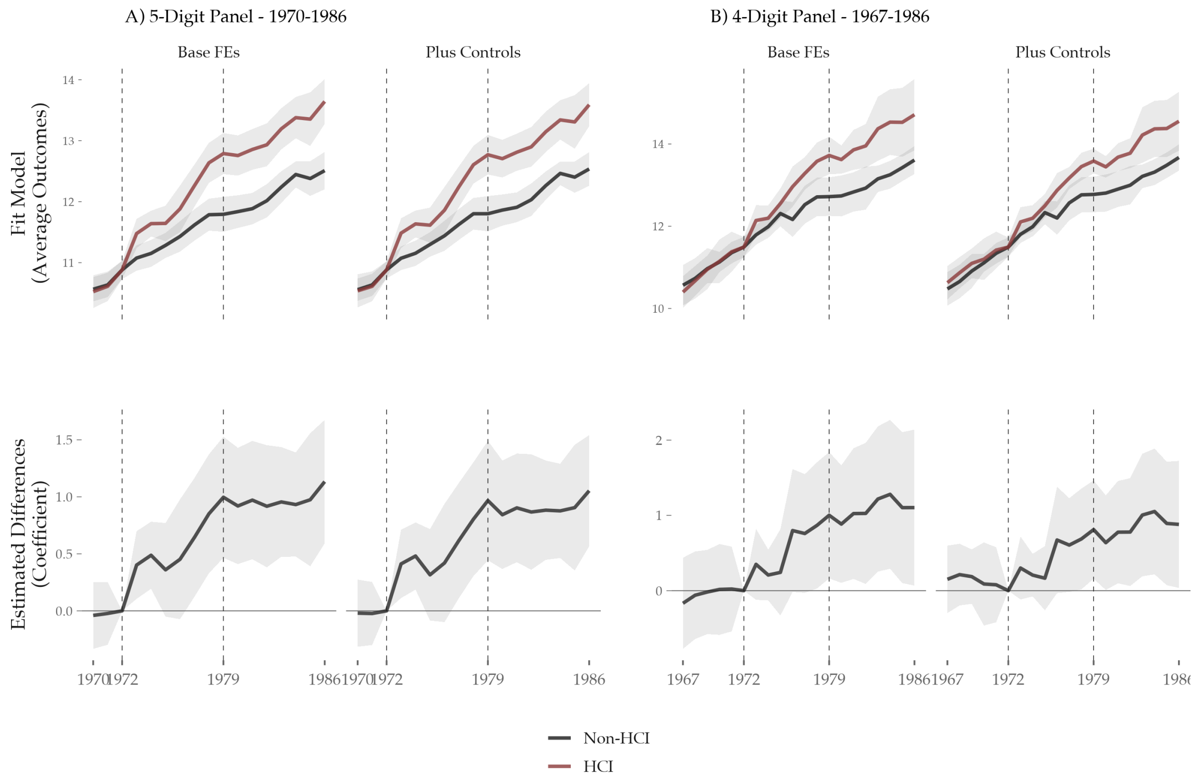


Figure shows dynamic differences-in-differences estimates for the relationship between HCI and real output, measured as the real value of shipments. Top row plots averages for HCI (red) and non-HCI industry (black), or the fit DID model. Bottom row shows dynamic differences-in-differences estimates. Panel A corresponds to estimates for detailed (short) 5-digit level panel. Panel B corresponds to estimates for aggregate (long) 4-digit level panel. 'Base FEs' refers to baseline regressions with just two-way fixed effects, and 'Plus Controls' refers to specifications with full pre-treatment controls, interacted with time effects. Estimates are relative to 1972, the year before the HCI policy intervention. The line at 1973 is the start of the policy. The line at 1979 demarcate the fall of the Park regime. Standard errors are clustered at the industry-level and corrected for heteroskedasticity. Confidence bands are in light grey and correspond to 95 percent confidence interveals. Corresponding regression tables are in Appendix.

The top row of Figure 2 shows mean growth for HCI (red) and non-HCI (black) industries separately. These are simply the averages for treated and non-treated sectors fit from model (1). The bottom row of Figure 2 shows the estimated differences between the treated and non-treated, or traditional differences plots. Corresponding point estimates and standard errors are shown in Table B1, along with tests for joint significance for pre-trends.

Figure 2 presents three key patterns of industrial development associated with the HCI drive. I emphasize *patterns*. Although Figure 2 shows results for manufacturing output specifically, the patterns in 2 will re-appear across outcomes and data throughout this paper.

First, consider the pre-HCI period, 1967-1972. For output, Figure 2 shows that HCI and non-HCI industries evolved similarly. This is clearest in "long", aggregate 4-digit data. Pre-1973 estimates are virtually zero. Pre-period coefficients are, individually, insignificant, and F-tests in Table B1 report that they are also jointly insignificant.

Second, after the 1973 intervention, Figure 2 shows that marked differences between treated and non-treated sectors emerged. During the HCI drive period, relative to 1972, these differences widen and become salient. This divergence is starkest in estimates for 5-digit data in panel A, and panel B reports similar divergence for aggregate data, mostly significant over the HCI drive period.

The top row of Figure 2 highlights the importance of the counterfactual manufacturing industries used in the DID strategy. The estimated *differences* shown at the bottom of 2 do not appear to be driven by the decline of control industries. That is, differences may emerge if industrial policies harm control industry, even where they fail to expand HCI output.[31]

Third, after 1979, Figure 2 shows the effect of the HCI period were not transitory. For the liberalization period, post-1979, HCI and non-HCI industries are still significantly different in terms of the value of output production, relative to 1972 levels. Following the fall of HCI and the Park regime, estimated differences diminish and become noisier. Nevertheless, the two types of manufacturing industries remain distinct.

The three patterns shown in Figure 2 are similar across measures of output. The patterns above are the same if one measures output as gross output (Table B1 columns 4-6) or value added (Table B1 columns 7-9).

B) Industrial Development Beyond Output Growth HCI is associated with shifts across a wider set of industrial development outcomes. A core aim of HCI was to reallocate manufacturing activity from the light industry—the industry Korea had become associated with during their 1960s expansion—to HCI industry. Figure 3 shows estimates for industrial reallocation estimates (Table B2 column 1), with industrial reallocation measured as industry share of total manufacturing output.

Figure 3 shows that HCI policy coincided with a significant shift in the share of industrial activity to HCI industries. Table B2 reports these estimates, alongside employment share. Estimates in panel A, columns 1 and 8, are significant for both outcomes by 1976 and remain significant thereafter. In the HCI post-period, the share of economic activity in HCI is durable, though estimates are less precise for aggregated data (panel B, columns 1 and 8). Importantly, B2 shows no pre-trends in the reallocation of activity and joint tests reject differences different than zero before the intervention.

Figure 3 also plots the substantial rise in the number of plants operating in HCI markets. The number of HCI plants remains significantly higher, relative to baseline levels, through the liberalization of HCI. Column 4 of Table B2 shows that estimates for plant activity are highly significant, starting immediately after 1973. Although positive, estimates are less precise in 4-digit data. Estimates for plant size, on the other hand, are weak (Table B2 column 5) and imprecisely estimated. Note that size pertains to plant size, not firm size, as the HCI era associated with the expansion of South Korean firms. Firm-side measures, like those related to concentration, are thus not in this study.

Coarse measures and proxies for productivity changed differentially across HCI and non-HCI during the policy period. Figure 3 (Table B2, column 2) shows a relative decline in output prices for HCI industry. These results are most precisely estimated in the 5-digit data (Table B2 part A), with estimates significant through the duration of the program. Estimates are less precise for aggregate 4-digit data (part B). Due to the coarseness of the data, I appeal to proxies of productivity, as industry-level data does not allow me to convincingly estimate TFP.

Averages for labor productivity in HCI and non-HCI data are shown in the top row of Figure B1 panel A for the detailed panel, along with estimated differences (bottom row). Trends in the two industries are similar through the mid-1970s and diverge through the HCI period. Table B2 column 3 shows a positive increase in real value added per worker. Here, labor productivity rises through the period, and is significant for a number of post-1973 years in 5-digit data (part A), and less precise for 4-digit data (part B).

Prices, shown in the second row of Figure 3, merit discussion. A naive reading of DID estimates may conclude that prices declined for HCI versus non-HCI. Similarly, pre-1973 differences in Figure 3 may indicate downward pre-trend for output price. Figure 3 panel B, however, shows a more subtle story. Average prices between HCI and non-HCI sectors (top panel B, Fig. B1) show that output prices grew markedly through the

[31]For example, Cerqua and Pellegrini (2017) shows similar effects for targeted policy in Italian industry, which while beneficial for treated firms, was harmful for un-treated firms.

1970s across sectors, due to inflationary pressure in the period. However, during this period, HCI prices break with the control industry averages, and become significantly lower. It is not that prices declined, rather that they remained significantly lower during the period.

Notably, prices are relatively lower in HCI industry. The price effects shown above contrast with industrial policy experiences elsewhere, where inefficient IP and protection are often associated with relative increases in output prices. In Egypt, India, and Turkey, heavy industrial policies may have effectively increased the relative price of capital and intermediate goods (Schmitz Jr 2001). The positive relationship between prices and interventions may be the norm rather than the exception; see Blonigen (2016) for the case of steel.

Table B2 reports that labor outcomes, such as total employment and average wages, responded positively to HCI during and after the period. For total employment, 5-digit estimates are strongest and precisely estimated—significant across most post-HCI periods (part A, col. 6). Estimates are positive, though noisier for aggregate 4-digit estimates (part B, col. 6). Likewise, wages responded positively for both series, though they are noisy. This is not surprising, as through HCI (and beyond) South Korea exercised various forms of wage repression.

Figure 3: Impact of HCI on Key Industrial Development Outcomes

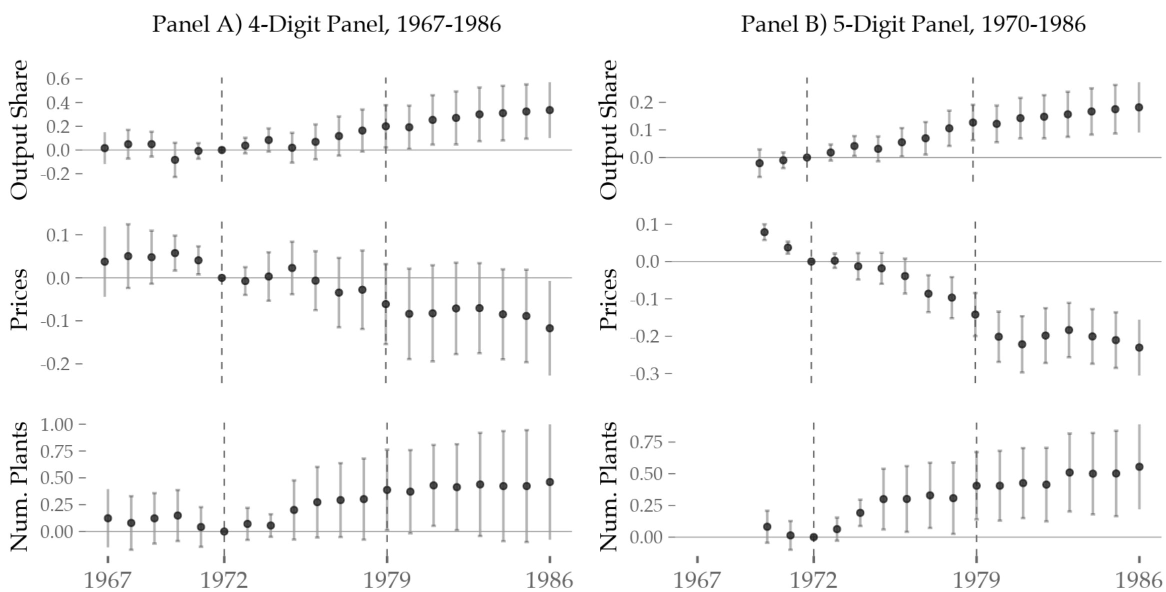


Figure shows dynamic differences-in-differences estimates for the relationship between HCI and industrial development outcomes. Output Share manufacturing share of industry output. Prices are industry-level output prices. Num. Plants are the number of establishments operating in a giv industry. Panel A corresponds to estimates for the longer, aggregate 4-digit. Panel B correspond to estimates from the 5-digit panel. All outcomes are ihs normalized to deal with 0s and (where possible) negative values. All regressions are estimated using a two-way fixed effect specification, and include baseline controls (pre-1973 wages, plant size, and labour productivity and costs) interacted with time effects. Figure plots coefficients of interest (black) from intereaction of interest: HCI x Year. Estimates are relative to 1972, the year before the HCI policy intervention. The line at 1973 is the start of the policy. The line at 1979 demarcate the fall of the Park regime. Standard errors are clustered at the industry-level and corrected for heteroskedasticity. Confidence bands are in light grey and correspond to 95 percent confidence interveals. Corresponding regressio tables are in Appendix.

C) HCI and Dynamic Comparative Advantage Export performance was central to the HCI's quest for industrial transformation (Hong 1987). A key target of the drive was to attain 50 percent share of HCI exports by 1980 (World Bank 1987). This section considers the shifting structure of trade during and after the HCI era.

Since HCI sought to promote industries for which it had unrealized, latent comparative advantage, I consider measures of revealed comparative advantage. Figure 4 shows estimates for the relationship between HCI and revealed comparative advantage (RCA) across SITC (Rev.1, 4-digit) goods, which are more disaggregated than

Figure 4: Impact of HCI on the Evolution of Revealed Comparative Advantage, HCI vs. Non-HCI

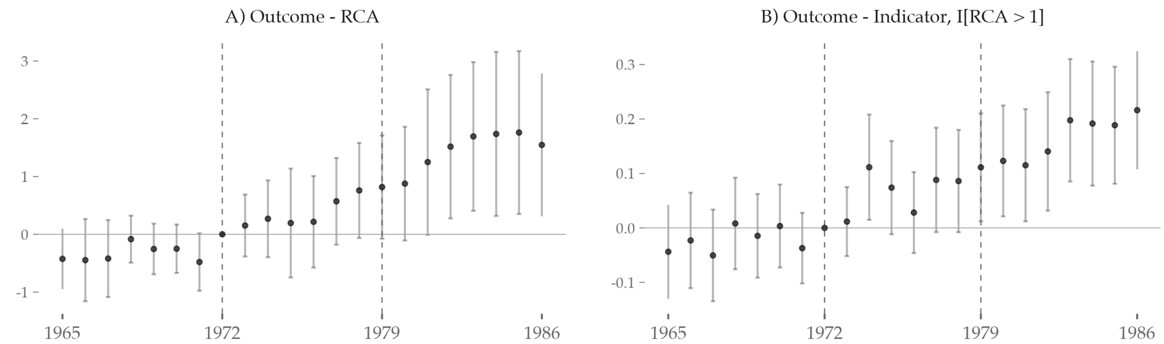


Figure shows dynamic differences-in-differences estimates for the relationship between HCI and export development. Trade data (SITC) covers the 1965-1986 period. Panel A corresponds to regression estimates for raw RCA index. Panel B corresponds to regression estimates for the probability of having realized comparative advantage in a goods market, where RCA is a dummy variable for RCA>1 (I[RCA>1]). Figure plots coefficients of interest (black) from intereaction of interest: HCI x Year. Estimates are relative to 1972, the year before the HCI policy intervention. The line at 1973 is the start of the policy. The line at 1979 demarcate the fall of the Park regime. Standard errors are clustered at the industry-level and corrected for heteroskedasticity. Confidence bands are in light grey and correspond to 95 percent confidence interveals. Corresponding regression tables are in Appendix.

both industry panels. RCA is measured as the traditional share of exports of a Korean product relative to the world share of exports for that good. Additionally, I create a dummy indicator that takes a value of one if a good's RCA index is greater than one.[32]

Figure 4 reports a strong, positive relationship between IP and revealed comparative advantage in treated goods. Estimates across RCA measures show a consistent pattern: First, a jump in the RCA of targeted products following 1973. Second, an upward trend during the HCI period. Third, a sustained export advantage after liberalization.

RCA estimates show that comparative advantage was indeed dynamic—and thus HCI export promotion may have taken time to gestate. This is clearly seen in Table B3 which shows that estimates become highly significant, and larger, toward the mid-1980s (across specifications). Though Figure 4 shows that the upward trend in HCI comparative advantage emerged during the drive, full comparative advantage is realized only years after.

Thus far, I have considered export performance by considering variation from goods-level trade data, that is, variation across SITC-level goods. This goods-level data is distinct from (and more granular than) industry-based data. Table 4 turns to industry-level trade performance. Here, goods-level (SITC 4-digit) trade values have been aggregated to the 4-digit industry level.

Table 4 column 1 shows a strong increase in the total value of exports and the structure of exports, measured by an industry's share of manufacturing exports (in the spirit of the export target of HCI). Column 2 shows the value of HCI exports relative to non-HCI exports, post-1973. The magnitude of estimates increase and become significant in the latter part of the 1970s, remaining significant through the post-1979 period.

Although HCI explicitly sought to expand HCI exports—and enabled HCI producers to import key intermediates—scholars have characterized HCI as a policy of import substitution industrialization (ISI) (See Dollar and Sokoloff 1990).

In Table 4, estimates for imports seem incompatible with a traditional ISI narrative. Column 4 in Table 4 reports that the value of imports for HCI and non-HCI industry is unchanged–and uniformly insignificant–over

[32]The Balassa measure for industry i defined as the ratio of exports (X), $\text{RCA}_i = \frac{X_i^{Korea}/X_{Total}^{Korea}}{X_i^{World}/X_{Total}^{World}}$.

the HCI period. The manufacturing share of HCI imports, on the other hand is negative, yet the standard errors are large.

The following section puts the export estimates above in context, and shows they are robust to the type of estimator.

D) Semiparametric Results and the Average Impact of HCI I now describe the average overall impact of the HCI, and confirm the impact of industrial policy through an alternative means of estimating the DID effects of the policy. I do so by implementing the doubly-robust differences-in-differences estimator proposed by Sant'Anna and Zhao (2020) and Callaway and Sant'Anna (2020).

Figures B2-B4 show that dynamic semiparametric DID estimates of the impact of HCI are similar to TWFE estimates. These plots show estimates of specification (3) across key industrial development outcomes. These semiparametric estimates are comparable to the linear TWFE estimates in the preceding section. These specifications include the same set of pre-treatment controls and cluster on the same dimension of the data. Bootstrap confidence intervals are given at the 10 percent and 5 percent levels—light and dark gray, respectively.

Figures B2 and B3 show the relationship between HCI and industrial development using the semiparametric parametric method. Figure B2 reports 4-digit estimates, and Figure B3 reports 5-digit estimates across a selection of code output and industrial development outcomes seen in the previous sections. Similarly, B4 shows semiparametric estimates for export development outcomes, such as revealed comparative advantage.

Qualitatively, the patterns plotted in Figures B2-B4 are similar to linear TWFE estimates. Though the doubly-robust DID relaxes some assumptions of the traditional estimators, the general dynamic pattern associated with HCI is robust. This is important, as this estimator re-weights treatment and control groups for balance.

Consider the overall average impact (specifically, the ATT) of the policy before and after 1972, which is also shown in Figure B2. Red dots demarcate the estimated ATT and the corresponding 95 percent confidence bounds are in pink.

Table 1 reports the average treatment effects, and compares semiparametric and OLS estimates side-by-side. Columns 1-2 list semiparametric results and columns 3-4 list linear TWFE results. Panels A and B, respectively, show estimates for 5-digit and 4-digit datasets. Estimates without controls are shown in columns 1 and 3, and those with controls are shown in columns 2 and 4. Preferred specifications are semiparametric estimates with controls.

ATT results in Table 1 show that the overall average impact of HCI targeting was meaningful and large.[33]. The preferred estimates in panel B, column 2 imply 130.53 percent growth in output for HCI industry relative to non-HCI manufacturers. Estimates for 5-digit data (panel A col. 2) imply 151.68 percent output growth (all significant at the 1 percent level). The semiparametric estimates for output tend to be larger than OLS estimates.

The average effect on labor productivity (panel A column 2) translates to a 63.88 percent increase in value added per worker for HCI industries after 1973. Labor productivity growth ranges between 38.68% to 63.88% across the estimates in 5-digit data. Productivity estimates are precisely estimated across semiparametric specifications, and across 4- and 5-digit data.

Table 1 also reports striking export development. On average, HCI's share of manufacturing exports increased 38.31 percent more than other industry. For the value of exports, estimates imply exports were over 200 per-

[33]The ihs-linear elasticities are calculated using $100 \times \exp\left(\hat{\beta} - .5 \times \widehat{Var}(\beta)\right) - 1$. At sufficiently high values, ihs approximates log-linear elasticities (Bellemare and Wichman 2020; Aihounton and Henningsen 2020).

cent higher for HCI manufacturers compared to non-HCI manufacturers. While dramatic, this is not out of bounds for the period. World Bank reports for the era (Cho and Kim 1995; Kim and Leipziger 1993) show that for HCI industries, the export share of output tripled through the HCI period (Kim and Leipziger 1993), as did the share of total manufacturing exports (Cho and Kim 1995). The grand export target of HCI (of 50 percent of manufacturing exports) was, in fact, surpassed by 1983 (*ibid*).

Table 2 shows the average effect of HCI on comparative advantage. In 1970, the mean RCA index for targeted sectors was .15, while the average RCA for Korea was 1.5. Linear probability estimates in Table 2 show targeted products were 0.13 percent more likely to realize comparative advantage on the world market (significant at 5 percent level). Indeed, estimates for each RCA measure are significant. Preferred RCA scores in column 2 show the revealed comparative advantage in HCI industry increased 29 percent over other manufactured exports (and significant at the 1 percent level).[34]

For output prices, Table 1 shows that semiparametric estimates are systematically smaller (in absolute terms) than OLS. Nevertheless they are strong (and significant at 1 percent), (col. 2) implying 13 percent lower output prices following HCI (4-digit data). Five-digit estimates imply 12 percent lower output prices.

Average employment effects of HCI in Table 1, too, are substantial. Here, semiparametric DID estimates tend to be larger than OLS DID estimates. Panel A column 2 implies employment grew 68 percent more for HCI manufacturers after 1973 (significant at 1 percent). Four-digit data implies that a 58 effect, though estimates are insignificant (0.508 point estimates with 0.322 standard error).

Discussion Thus, the results in this section show that the HCI policy bundle contributed to the development of targeted industry. The impact of HCI not only seems to have promoted industrial development over the planning period, but these effects have been durable, lasting after the end of the policy and through the period of economic liberalization in the 1980s.

The sections above showed a consistent pattern of industrial development across three sets of outcomes. First, the expansion of industrial output. Second, the development of broader industrial outcomes, such as output prices, value added per worker, and industry employment. Third, and importantly, the evolution of comparative advantage among exporters. These patterns are robust across data sets and the type of estimator. Last, the average effects implied by these estimates are economically meaningful.

The empirical relationship between industrial policies and industrial development is not a foregone conclusion (Lane 2020). Studying Japan's postwar industrial strategy, Beason and Weinstein (1996) show a negative relationship between development and targeting policies. Lee (1996) shows a similar negative relationship for South Korea in the 1970s. Researchers find these negative relationships, more broadly, in correlation studies of IP [Rodriguez and Rodrik (2001); Harrison and Rodriguez-Clare (2009); p.4092].[35] How may have policy in historical South Korea have been different?

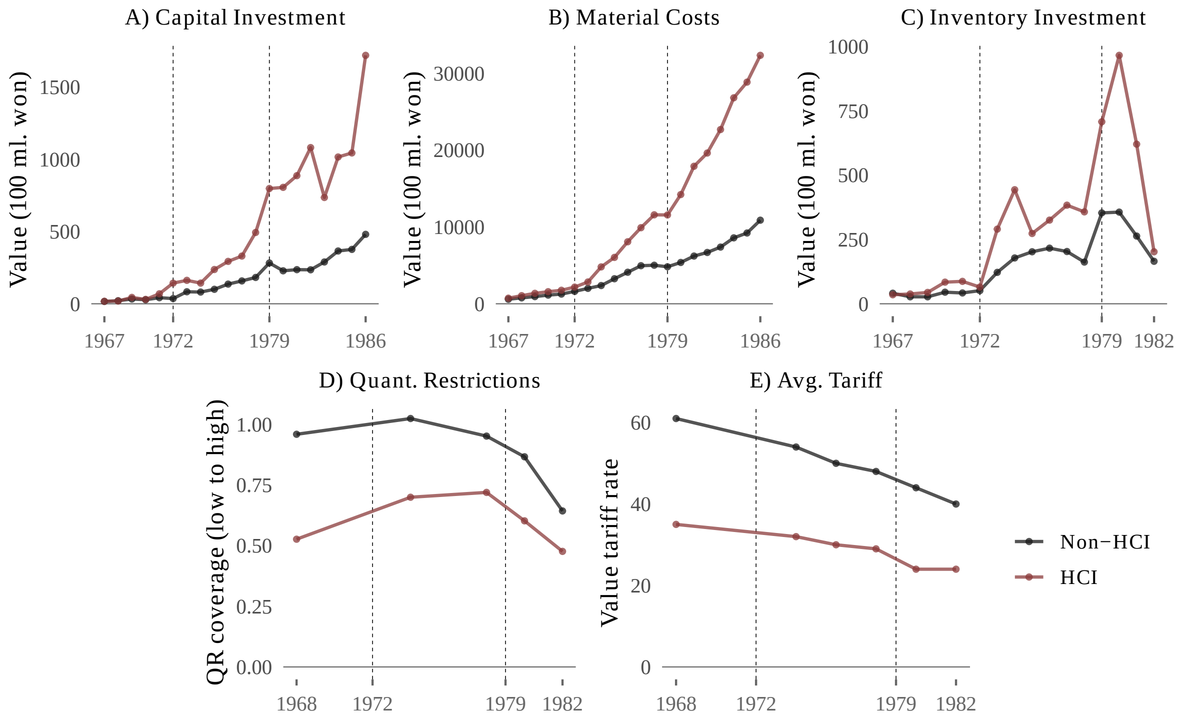
4.3 Direct Results - The Role of Policy

I now consider the policies underlying industrial development. This section does so in two steps. First, by showing how outcomes related to investment and production subsidies changed over the HCI period. Second, I show that the role of trade policy—namely, nominal output market protection—is more ambiguous.

[34] This refers to ihs-transformed outcome, which allow zero trade values and whose estimates are the most stable.

[35] A thoughtful study by Pons-Benaiges (2017) has since considered the impacts of Japanese sectoral targeting. Focusing on dynamic and static scale economies.

Figure 5: Average Investment Incentive and Trade Policy Outcomes 1967-1986



Notes: Each panel plots outcomes related to investment and protection. Points are averages across HCI and non−HCI industries. The top row, panels A−C, are outcomes related to investment incentives. Panel A reports mean, real total capital formation across HCI and non−HCI industries. Panel B reports real total inventory investments, a proxy for relaxation of capital constraints. Panel C shows real total material costs. Panels D and E show outcomes for trade policy. Panel D reports average ad valorem tariff rates (percent), and panel E shows quantitative restriction measures (QR). QR is qualitative ranking of coverage on products within an industry, 0 being minimal coverage and 3 being high coverage. See discussion in text.

A) Differential Responses to Investment and Production Incentives Is there evidence that investment incentives changed? In many settings, we do not directly observe investment or production incentives (see Kalouptsidi (2018) for excellent discussion). For HCI in particular, this is complicated by the fact that policy loans were disseminated by both the commercial banking sector and specialized banks (see section 2.C. With this in mind, I study how proximate—or, causally, "downstream"—outcomes changed over the HCI period in response to policy. These outcomes include those related to variable costs (materials expenditure) and fixed costs (total gross fixed capital formation), following the literature on credit policy in developing countries (Banerjee and Duflo (2014); Manova, Wei, and Zhang (2015)). Importantly, I also examine inventory investments. I do so because inventories are sensitive to firm financing (Carpenter et al. 1994), and firms ought to respond differentially to favorable credit conditions and cost of capital (Jones and Tuzel 2013; Dasgupta, Li, and Yan 2019).

I first consider changes in aggregate outcomes between HCI and non-HCI manufacturing industries over the HCI period. The top row of Figure 5 shows changes in average outcomes for treated (red) and control (black) industries from 1967 through 1986. Figure 5 shows a widening gap for fixed (panel A) and variable (panel B) costs across the two types of manufacturing industries. For gross capital formation, panel A shows this wedge begins around the start of the drive and widens through the HCI period. Panel B shows a similar, if not more acute, divergence in total material outlays. Both widen significantly at the onset of the policy. Like the pattern of output, fixed and variable cost measures stay relatively high, despite the decline of HCI policy.

Aggregate inventory changes, panel C of Figure 5, track the rise and fall of HCI policies. Following the 1973 HCI announcement, total inventory investments spike for HCI manufacturers, rising sharply following the

HCI announcement in 1974. Inventories spike again in the later 1970s, falling precipitously during the period of HCI's dismantling. Note the data goes until 1982.

Turning to industry data, Figure 6 shows DID estimates for incentive-related outcomes, from specification (1) from the detailed industry panel. Table C1 shows the full regression estimates and results at the 4-digit level. Like aggregate costs above (Fig. 5), Figure 6 shows this divergence starkest for materials. This divergence in material costs begins in 1973, and widens through the push. Table C1 shows these effects are significant for 5-digit data, starting in 1973, and grow in strength through the HCI period. The relative growth in material costs are also seen across data, yet estimates are noisier in aggregate 4-digit data.

Figure 6 panel C shows divergence in gross capital formation at the 5-digit level. Like material inputs, capital investment diverges between HCI and non-HCI through the HCI period, briefly declining (in HCI alone) post-1979, and recovering through the 1980s. Four digit estimates shown in panel B of Table C1 reject pre-trends, however, aggregate estimates here tend to be imprecise.[36]

The overall average (ATT) increase in material and investment after 1973 was substantial. Table 3 shows both doubly-robust semiparametric and linear DID estimates of the average effect. Preferred estimates (col 2, 5-digit panel) translate into a 118.83 percent relative increase in variable costs for HCI over non-HCI manufacturers. DID estimates for materials are highly significant for 5-digit data. Preferred estimates (col. 2) show a total 90.11 percent increase in investment for HCI over non-HCI manufacturers over the study period. All 5-digit DID estimates in panel A are significant, while 4-digit estimates are positive, yet imprecise.

Inventories ought to positively respond to favorable financial conditions in HCI industry. Table C1 column 3 shows that inventory investments track their aggregate counterparts in 5. Inventory estimates show sharp divergence, starting in 1973 (significant at a 1 percent level) and reaching another peak in 1977. Notably, (3) shows these estimates die down in the periods after HCI. Thus, the differential movements in inventories also indicate the favorable investment conditions in HCI industry—but only over the HCI windfall period.

Note that Table 6 shows disaggregated capital investment and further inventory measures. Importantly, Table 6 shows that inventory investment over sales was not changing, but rather *levels* of inventories (total investment, as well as products). This is important, as the rise in inventories over oil shocks typically refer to the inventory to sales ratio, not levels. As well, the increase in this ratio is in large part due to sales responding negatively to oil shocks (Herrera 2018). This was not the case during HCI, as sales increased for these sectors, in particular in the early years of the drive.

Korea's National Investment Fund, a state-administered source of credit for HCI (Section 2), emphasized the financing of machinery for HCI firms. Table 6 shows investment changed significantly across three main asset classes, specifically those related to equipment. Point estimates in Table 6, column 1 shows the results for investment are strongest for machinery and equipment, followed by building and factory-related fixed capital investment (col. 3). Transport equipment also increased during the HCI drive. These are consistent with the investment patterns incentivized by state-lending policy, which emphasized equipment and factory expansion (Yoo 1990; p.39-41; World Bank 1987).

Is it obvious that we would observe responses to investment or production incentives from IP? Based on the history of industrial policy, no. Importantly, if financial policies are redundant, they may not create new investment (outlays)—investment (outlays) that would have still occurred in the absence of policy. Still, in many contexts, *de jure* investment policy may not bind. Lazzarini et al. (2015) shows that for Brazil, capital from the BNDES development bank did not increase investment, and instead was allocated to politically connected firms where investments would otherwise have taken place. For East Asia, Yang (1993) argues

[36]In general, the 4-digit capital estimates are noisy, likely due to aggregation across asset class (to construct total investment estimates) and through time (across code changes).

investment subsidies in Taiwan (late-1980s) did not contribute to capital formation, echoing a common criticism of industrial investment schemes: that investment would have occurred anyways. DID results above show otherwise, in the case of HCI.

Figure 6: Input Use and Investment During HCI Drive, HCI vs. Non-HCI Industries

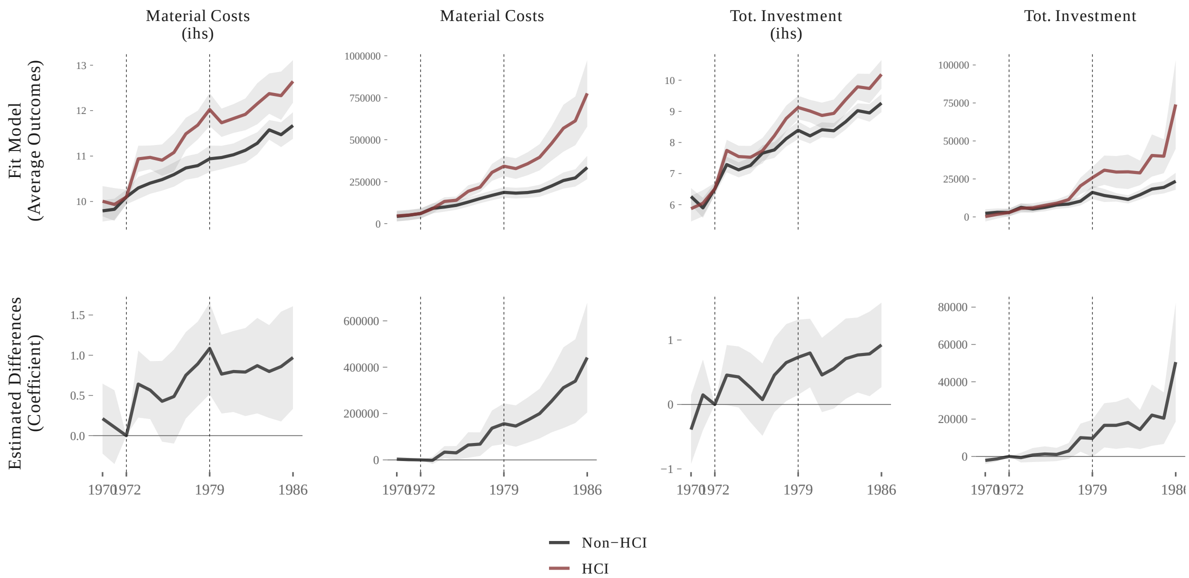


Figure shows dynamic differences−in−differences estimates for the relationship between HCI and responses to investment incentives. Panels report estimates for real total input material costs total investment, or total gross capital formation. For comparison with aggeragate plots, both ihs and non−normalized estimates are given. All panels report estimates from 5−digit industry panel (1970−1986). Specifications include controls for (pre−treatment) costs, avg. wages, avg. plant size, and labor productivity, interacted with time effects. Regression tables in Appendix. Figure plots coefficients of interest (black) from intereaction of interest: HCI x Year. Estimates are relative to 1972, the year before the HCI policy intervention. The line at 1973 is the start of the policy. The line at 1979 demarcate the fall of the Park regime. Standard errors are clustered at the industry−level and corrected for heteroskedasticity. Confidence bands are in light grey and correspond to 95 percent confidence interveals. Corresponding regression tables are in Appendix.

B) Trade Policy - Protectionism with an "intensity unmatched" in the postwar period? Narratives of HCI have focused on the central role of trade policy. Many have emphasized output protection and HCI has been popularly characterized as overtly protectionist. Lall described the drive as the "most intensive form of trade intervention in East Asia," which protected HCI sectors "behind high and variable import protection at a speed and with an intensity unmatched in recent economic history" (Lall 1997).

Figure 5 panels D and E show two simple measures of market protection for HCI and non-HCI industry, for five periods between 1968-1982.[37] Panel D reports the average tariff rates (percent), and panel E shows measures of quantitative restriction coverage (QRs) (discrete $\{0, 1, 2, 3\}$, low to high).[38]

Panels D and E, Figure 5, show output protection—measured in terms of *ad. val.* tariffs and QR coverage—was lower in HCI manufacturing industry than in others. Figure 5 reports average measures of nominal protection fell, with a slight rise in the 1970s before ebbing by 1982s. Liberalization of trade policy would occur in full after 1982 (Yoo 1993).

[37] Undoubtedly, the subsidies and incentives used over the period constitute a form of protection. I focus here on the institutional use of different policy levels, which will have different welfare implications and may have different consequences on the evolution of industry.

[38] By nature their nature quantitative restrictions can be heterogeneous and aggregating them into single tariff equivalents can data intensive. Following one common approach of the non-tariff barrier literature, Luedde-Neurath (1986), coded the severity of quantitative restriction—mainly quotas—for products within 4-digit industries using a 0-3 scale. Zero being no restrictions to three, being most severe.

Drilling down, Figure C1 shows convergence in the distribution of output trade policy between HCI and non-HCI manufacturing industry, for five years between 1968-1982. The right column of C1 plots the kernel density estimates for tariff through time. The left column plots the kernel density estimates of QR coverage through time. The distributions start 1968 quite dispersed, but eventually overlap by 1982. Importantly, the distribution of HCI-sector trade policies does not shift toward protectionism during the HCI drive period.

Nevertheless, I evaluate the case for overt protection more formally. I do so by regressing industry-level trade policy outcomes, and measures of *input* protection, on a binary indicator for HCI industry. I consider the following equation,

$$Y_{it} = \alpha + \beta \cdot \left(\text{Targeted}_i\right) + \tau_t + X_i'\Omega + \epsilon_{it} \tag{4}$$

where i are industries and t are the five periods covered in by trade policy: 1968, 1974, 1978, 1980, and 1982. Specification (4) controls for time effects τ_t and includes baseline controls for wage bill, material costs, plant size, labor productivity.

I estimate equation (4) in levels and differences, Y and ΔY. The coefficient of interest is β, conveys differences in the average level—or change—in policy between HCI and non-HCI industries over the five periods of trade data.

First, consider differences in the *level* of output protection between treated and non-treated sectors. Table 5 panel A reports that output market protection was, on average lower, for HCI industry. Columns 1-2 shows this for average output tariffs, while columns 5-6 shows this for QR coverage (significant at the 1 percent level). For completeness, column 2 reports estimates weighted by the pre-1973 value of imports. Column 4 restricts the sample to post-1973 observations, and these estimates imply the level of tariffs for HCI industry was 23 percent lower through the HCI period.

Perhaps trade policy *changed* differentially for HCI? Panel A, columns 9-12 of Table 5 report estimated changes in output protection between 1968 and 1982. All estimates are positive, yet all insignificant. The most liberal estimates suggest that, at best, tariffs increased 4 percent over the period. However, it is likely this is because they fell *less* for HCI than non-HCI industry, on average.

On the other hand, HCI industries were assisted by trade policy *vis-a-vis* exemptions on duties and tariffs for imported intermediates (section2) (Mason 1980; Nam 1995). I thus consider the differential exposure to input protection using industry-level measures of input protection built from input-output tables (described in section 3). These measures of input tariff exposure account for the potential exemptions afforded to HCI industry during the period.

Table 5 panel B reports estimates for input exposure outcomes. Columns 9-12 report estimates for changes in exposure to input protection. Column 10 suggest that HCI manufacturers enjoyed a 6 percent reduction in import tariffs due to HCI drive import exemptions. Estimates for reductions in quantitative restrictions, while negative, are insignificant.

Discussion This section explored the potential policies underlying HCI, examining responses to investment incentives and outcomes related to trade policy. This section saw more compelling cases for the former than the latter. In particular, I showed variables (causally) downstream from industrial incentives, such as material costs and capital formation, changed significantly for HCI industries. If control industries serve as appropriate counterfactuals, then incentives likely translated into input use and investment that would not have occurred in the absence of policy.

On the other hand, it is unclear whether nominal output market protection was the tip of the HCI spear, at least at the aggregate level. On average, nominal output protection was lower for HCI industry, while changes in output market protection are not easily detectable—at least at the granularity of this paper. Moreover, South Korea trended toward trade policy liberalization, more broadly. This is not to say protection did not exist. After all, subsidies and incentives are seen as non-tariff barriers tantamount to *de facto* protection. Yet, narratives of overt ISI-style policy seem unlikely.

5 Network Impacts of Industrial Policy

The case for industrial policy has long been motivated by the existence of positive spillovers beyond treated sectors (Krueger and Tuncer 1982; Grossman 1990; Krugman 1993). Classic developmental theorists (Scitovsky 1954; Rasmussen 1956; Hirschman 1958) considered how the effects of industrial interventions might produce spillovers, beyond the recipients of policies, through input-output linkages. This section examines how the development of HCI sectors impacted non-HCI sectors through the input-output network. Above I showed (section 4.2) that industrial development outcomes and (section 4.3) policy-related outcomes changed differently for targeted sectors during and after the HCI period. I now consider how this may have impacted external industry.

I use the language of traditional development economics (*linkages*) to explore network spillovers from HCI. I consider two directions of this propagation. First, through *backward linkages*. That is, to upstream industries selling inputs to targeted sectors. Second, through *forward linkages*. That is, to downstream industries purchasing inputs from targeted sectors. Throughout, I use the terms "backward" and "forward" from the vantage point of a targeted industry. Both refer to the propagation from the perspective HCI industry. HCI industry affects upstream suppliers through backward linkages. Conversely, HCI industry affects downstream buyers through forward linkages.

The network in Figure D2 visualizes linkages for the pre-HCI Korean economy, using the 1970 South Korea input-output accounts. Red nodes are targeted industries, and gray nodes are non-targeted industries. The size of nodes reflects the total number of connections (or "degrees").[39] The connections shown in D2 indicate a link between two industries. Specifically, nodes are connected if an industry sells its output to another downstream industry. These outward links are thus forward linkages. The Kamada-Kawai (1989) algorithm (1989) determines the proximity of nodes to one another in the figure, where industries with more links appear closer to one another.

5.1 Measuring Linkages

To estimate the impact of industrial policy through linkages, I construct measures of network exposure to HCI targeting using digitized 1970 ("basic") input-output accounts for South Korea. I use 1970 table, as they predate the HCI drive and limit the extent to which links are endogenously formed with respect to the intervention.

Formally, consider two industries, where i is a non-targeted industry and j is a treated industry. The non-targeted industry is backward linked if it supplies output to a treated industry. This direct relationship is thus denoted ij. Firms have many such links. For example, the sum of backward linkages is equal to the weighted sum of links between a producer and those using their output. I measure this as

[39] For clarity Figure D2 plots "medium" 153×153 input-output accounts. "Treated" HCI nodes in Figures D2 differ slightly from those used in the industrial census data set as input-output data is presented at a different level of aggregation and using a different coding nomenclature.

$$\text{Backward Linkages}_i = \sum_j \alpha_{ij} \qquad \text{with} \;\; \alpha_{ij} = \frac{\text{Sales}_{ij}}{\sum_{j'} \text{Sales}_{ij'}}. \tag{5}$$

where weight α_{ij} is the value of i's sales to j, divided by the total sales from i to all industries j'.[40] The denominator of 5 is the sum of industry i's sales to all sectors. These include sales to tradable and service buyers, as well i sold as final products.

I measure policy exposure by summing the share of sales (α_{ij} in 5) to targeted industries only, calculated by

$$\text{Backward HCI Linkages}_i = \sum_{j \in \text{HCI}} \alpha_{ij}. \tag{6}$$

In other words, (6) measures only linkages between i and targeted buyers $j \in$ HCI, where HCI is the set of targeted industries. The *forward* linkage analog of 6 are calculated in much the same way, but flipped. For the forward linkage case, Forward Linkages$_i$ is equal to $\sum_j \alpha_{ji}$, and Forward HCI Linkages$_i$ is equal to $\sum_{j \in \text{HCI}} \alpha_{ji}$.

Equation 6, however, captures only *direct* (one degree) connections—or spillovers—that propagate between HCI industries and others. Nevertheless, total (n-degree) backward linkage measures are calculated using a method similar to the direct effects above, except using coefficients from Leontief matrix (see Technical Appendix) instead of the technical input-output matrix. Total linkages are calculated by

$$\text{Total Backward HCI Linkage}_i = \sum_{j \in \text{HCI}} \ell_{ij}. \tag{7}$$

where equation 7 adds industry i's Leontief coefficients for purchasing sectors, j, but only for those targeted by the HCI drive.[41] In other words, for an industry row i, I add column-wise entries j for j's in the set of targeted industries. Thus, Total Backward HCI Linkage$_i$ in equation 6 captures the total exposure of industry i through all direct and indirect linkages. The Total Forward HCI Linkage$_i$ measure is calculated in a similar way, though the indices are reversed. Instead of summing across columns for each row, I sum across rows j, for each column i.

Figure D1 lists non-targeted sectors with the highest direct connections to targeted sectors—measured by Backward HCI Linkages$_i$ and Forward HCI Linkages$_i$, equation (6).[42] The left of figure D1, shows the top twenty (5-digit) manufacturing industries with the highest share of inputs sourced from targeted sectors. These sectors include *Jewelry & related articles* and *Plastic products*. Many sectors of these sectors tend to be more downstream industries. The right of Figure D1 lists the top 20 industries with the highest (direct) backward links to targeted sectors. In other words, the list of non-treated industries supplying a large share of output to HCI industry. Unsurprisingly, many of sectors supplying a large share of output to HCI industries are fairly upstream sectors, closer to the raw materials end of the supply chain.

[40] For simplicity, I do not count i's sales to itself. Substantively, this means excluding diagonals α_{ii} in the input-output matrix.

[41] See Technical Appendix for derivation of the Leontief inverse table used in the calculation. As with the direct linkage calculations, I do not count on-diagonal coefficients.

[42] Names of the sectors reflect both the harmonization of industry names through time, as well as the matching of I-O tables to 5-digit industry codes. Industry are meant to convey a general, qualitative pattern to the reader.

5.2 Network Spillovers: Empirical Strategy

I use linkage measures above (section. 5.1) to estimate the impact of the HCI industrial policy on industries downstream and upstream from treated industries. I do so by using a dynamic DID analysis in the spirit of equation (1). Intuitively, I estimate the spillovers of HCI by comparing outcomes across sectors with strong versus weak linkages, on either side of 1973. I consider the following specification,

$$
\begin{aligned}
Y_{it} = \alpha_i + \tau_t + \sum_{j \neq 1972} \gamma_j \cdot \left(\text{Backward Linkage}_i \times \text{Year}_t^j\right) + \\
\sum_{j \neq 1972} \delta_j \cdot \left(\text{Forward Linkage}_i \times \text{Year}_t^j\right) + \sum_{j \neq 1972} X_i' \times \text{Year}_t^j \Omega_j + \epsilon_{it}
\end{aligned}
\tag{8}
$$

where Y is an outcome, i indexes each 5-digit (or 4-digit) industry. Subscript t denotes the years, which are $1967-1986$ for the 4-digit panel and $1970-1986$ for the 5-digit panel. The baseline equation (8) is a linear TWFE specification. Fixed effects and controls are the same as (1). Since these measures do not change through time, they are interacted with time effects, $X_i' \times \text{Year}$, allowing their impact to vary through time.

The coefficients of interest in (8) convey the dynamic impact of linkage exposure on upstream and downstream industry. Importantly, (8) includes *two* types of linkage effects. The first set of coefficients, γ_j, conveys the impact of HCI policy through backward links. The second set, δ_j, convey the impact of HCI policy through forward links. Thus, the set of estimates, γ_js (δ_js) conveys the differential development of sectors with high backward (forward) linkages with HCI industry, relative to those with fewer linkages.

Before 1972, the vector of coefficients ought to be 0, and should show no prior differences between linked industries. Estimates after 1972 should increase until at least 1979, the start of HCI's liberalization. Estimates for the post-liberalization period may indicate long-run effects of policy (if coefficients continue to be greater than or equal to earlier estimates) or temporary policy effects if coefficients decline significantly.

For this empirical exercise, I take the 1970 input-output network as fixed, determined by forces prior to the shock. The identifying assumption is that differences in industrial development between more-less backward (forward) linked industries would have evolved similarly in the absence of the HCI policy.

It is worth noting that the dynamic DID specification (8) uses a continuous treatment variable, whereas DID estimates in the first part of this paper, section 4, used a binary treatment variable. The continuous treatment precludes the use of the semiparametric DID methods used earlier. The following results section, thus, presents two-way fixed effects estimates and avoids binarization of linkage variables.

5.3 Network Results

I break my analysis into forward and backward linkage results. I start with, and focus on, forward linkages. Part 1 shows that sectors with a relatively strong forward link to HCI industry—downstream users dependent on HCI inputs—developed more over the HCI period. Similarly, I show evidence of dynamic comparative advantage for downstream exports, for the periods *after* HCI. Part 2 turns to backward linkages, where I show the relatively limited, or even weakly negative, impacts of HCI policy on sectors upstream from HCI industry.

5.3.1 Forward Linkages and Downstream Development

I present three results for the impact of HCI on downstream industry. First A), I report downstream sectors industry with stronger forward linkages have higher relative output growth and industrial development over HCI. I then B) show longer-run effects of forward linkages on revealed comparative advantage for downstream exporters using trade data. Last C), I highlight the potential role of intermediate use in promoting these effects.

A) Downsteam Industial Expansion and Development Theoretically, expansion of supply from targeted sectors is beneficial to forward-linked sectors.[43] Figure 7 shows the relationship between forward linkage strength and downstream output, plotting the dynamic DID estimates from equation (8).

Rows in Figure 7 show estimates for real value added (top) and output prices (bottom). This section focuses on value added measures of output, given the emphasis on the stages of production. Estimates with gross output tend to be larger, but the patterns are the same. Columns show estimates by industry panel (4 digit vs. 5 digit data), and by sample (full sample vs. non-HCI sample).

We are interested in how HCI impacts external sectors through forward linkages. Estimates in panels B and D of Figure 7 use only variation from the "Non-HCI sample," excluding all HCI observations. This restriction, however, significantly reduces the size and power of the data. especially in more aggregate 4-digit data. Panels A and C, alternatively, show estimates using the full sample of industries, but controlling flexibly for HCI industry through time. These "Full-Sample" estimates include an additional control interaction, Targeted $\times$ Year.

Estimates in Figure 7 show that industries with stronger forward linkages expanded output more over the HCI drive period. Before 1973, differences between HCI-reliant industries were negligible. Table E1 presents the full regressions from these plots, and provides joint tests for pre-trends. All tests reject pretends, except columns 3-4 panel B. Columns 3-4 show forward-linked sectors had relatively higher output in the 1960s, a lead which trended *downwards* and became insignificant before 1973.

Table 7 reports average estimates, or the pre-post version of equation (8). For simplicity, Table 7 shows DID estimates for both forward linkages and backward linkages; in dynamic differences-in-differences tables, they are shown separately due to size. This section discusses the analysis of forward linkages; I discuss backward effects in the following section.

For value added, average forward linkages effects in Table 7 (panel A col. 2) imply a 1 unit rise in the share of links to HCI translates into 2.18 percent more output (1.35 percent in 4-digit data), with estimates significant at the 5 percent level. Five-digit estimates in panel A are all positive and significant.

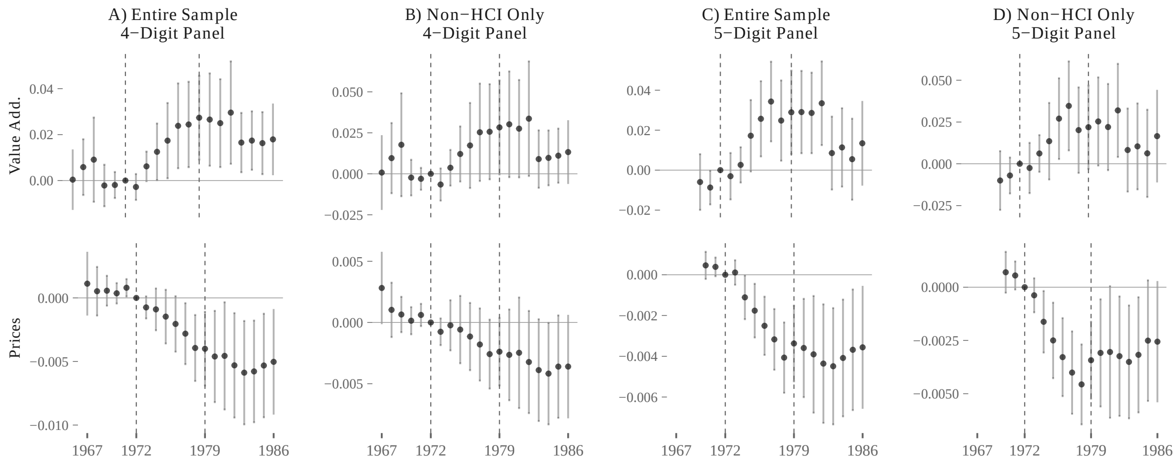
Similarly, Table E3 reports the average effects for *total* forward linkages, or the linkages accounting for n-degree (Leontief) linkages between downstream industry and HCI suppliers. Like direct links, Table E3 reports a robust relationship between total forward linkage exposure and downstream growth in relative value added. Notably, total forward linkages effects are strongest in the Non-HCI sample. Point estimates (panel A col. 4) imply a one unit rise in total forward linkage strength is associated with 3.48 percent higher value added after 1973 (significant at 10 percent level).[44]

Beyond output, positive supply shocks in targeted industries can decrease output prices in downstream industry. The bottom row of Figure 7 shows the impact of forward linkages on downstream prices. Downstream industry with more connections to HCI have relatively lower output prices during and after the drive. Pre-1973, prices were higher in forward-linked sectors. After 1973, they decline markedly. This steep relative drop is shown across data sets and samples across panels in Fig. 7. After 1979, these differences between prices stop widening, though prices remain relatively lower in forward linked sectors through the 1980s.

[43] This result can be derived from many theoretical frameworks, though would result from one with. Refer to previous version of the paper for a basic theoretical model.

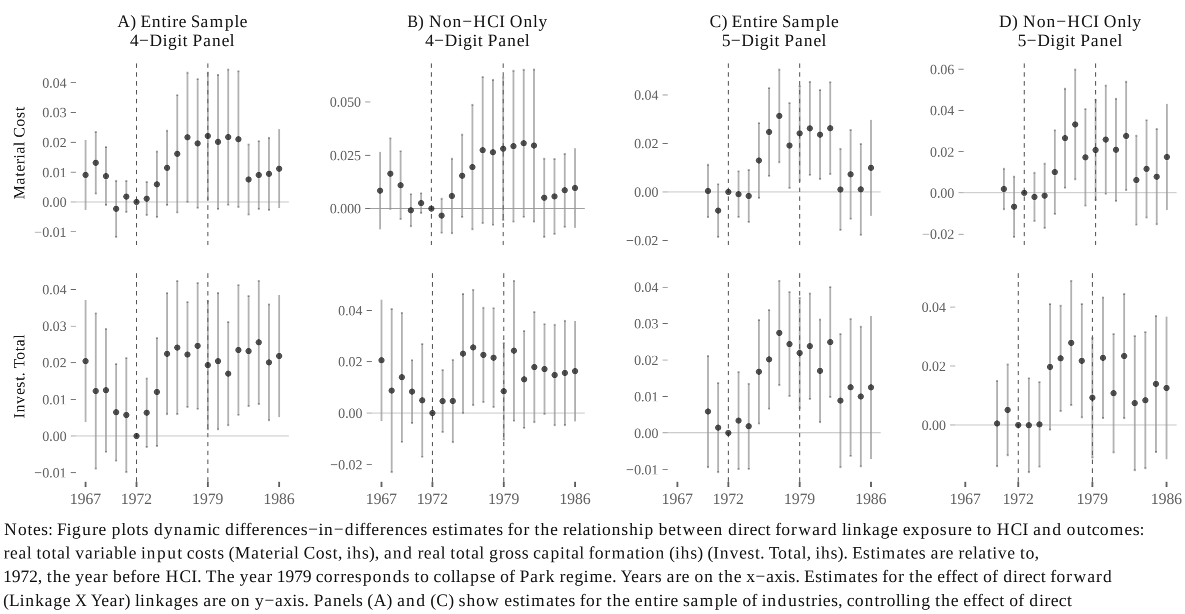
[44] Note that Leontief coefficients are different units than direct input-output measures, which are interpretable as the percent share of inputs between 0-100.

Figure 7: Impact of Direct Forward Linkages on Downstream Value Added and Output Prices



Notes: Figure plots dynamic differences−in−differences estimates for the relationship between direct forward linkage exposure to HCI and outcomes: real output (value shipped) (top) and value added per worker (bottom). Forward linkage measures corresponds to 1970 share of in sourced directly from HCI industry. See text for details. Estimates are relative to, 1972, the year before HCI. The year 1979 corresponds to collapse of Park regime. Years are on the x−axis. Estimates for the effect of direct forward (Linkage X Year) linkages are on y−axis. Panels (A) and (C) show estimates for the entire sample of industries, controlling the effect of direct targeting, HCI x Year. Panels (B) and (D) shows estimates for only non−targeted industry. Regressions include controls for direct backward linkage connections, interacted with time. Regression tables in Appendix. 95 percent confidence interveals are shown in gray.

Figure 8: Mechanisms: Direct Forward Linkages on Downstream Input Use and Investment



Notes: Figure plots dynamic differences−in−differences estimates for the relationship between direct forward linkage exposure to HCI and outcomes: real total variable input costs (Material Cost, ihs), and real total gross capital formation (ihs) (Invest. Total, ihs). Estimates are relative to, 1972, the year before HCI. The year 1979 corresponds to collapse of Park regime. Years are on the x−axis. Estimates for the effect of direct forward (Linkage X Year) linkages are on y−axis. Panels (A) and (C) show estimates for the entire sample of industries, controlling the effect of direct targeting, HCI x Year. Panels (B) and (D) shows estimates for only non−targeted industry. Regressions include controls for direct backward linkage connections, interacted with time. Regression tables in Appendix. 95 percent confidence interveals are shown in gray.

Full regression estimates for prices are shown in Table E2. Like the direct impact of HCI on targeted sector prices, joint tests for significance in Table E2 show that pre-1973 prices were higher in more versus less linked industries. Point estimates also suggest they may have been trending downward prior to the policy. While the effects shown in Figure 7 suggest a substantial effect, it may be that these (differential) prices trends were in motion. However, if such trends were already occurring, it is notable that industrial policy did not buck this trend, much less raise prices in these sectors (see discussion for price results in section 4.2).

The overall, average relationship between forward linkages and output prices is significant, shown by DID estimates in Table 8. DID estimates in panel A (col. 2) show a one unit rise in the share of total HCI links is associated with 0.26 percent lower output prices in forward-linked industry.

Table E4 shows correspond estimates for total, forward linkage exposure and prices. The impact of total forward linkages on prices is reliably negative for total forward linkage estimates.

Beyond output and prices, forward linkages positively impact downstream sectors across outcomes in Table 9. Estimates in 9 show a dynamic, positive relationship across employment (columns 1-2), average wage (3-4), number of establishments (5-6), and value added per worker (7-8). Estimates are most significant across the 1973-1979 push, precisely estimated in 5-digit data (panel A). In full and non-HCI industry samples, the number of plants is significantly higher in forward-linked sectors, relative lesser-linked sectors, for all years past 1979. Labor productivity and wage estimates are noisier in non-HCI samples, and estimates for both outcomes dissipate after 1979.

Employment is also significantly higher in forward-linked sectors during the policy window. Before HCI, panels A and B in Table 9 show total employment was indistinguishable between high and low linkage industries (cols. 1-2). Across data, relative employment becomes significantly higher in the mid-1970s through the early 1980s, including in the non-HCI sample. Estimates become noisier in the 1980s, but remain positive.

Differences-in-differences estimates in Table E5 summarize the overall average impact of forward linkages on industrial development outcomes. Bolstering the dynamic estimates in Table 9, Table E5 shows a positive impact of forward linkages over the post-1973 period. Labor productivity estimates, due to its post-1979 fall, are noisiest. The average impact of forward linkages are also positive for total (Leontief) linkage effects, which are provided in Table E6. Thus, direct linkage effects also align with total linkage effects.

B) Forward Linkages and the Evolution of Downstream Comparative Advantage The impact of HCI on downstream exports is positive, and longer lasting. Above, I showed forward linkages were robustly related to downstream (external) industrial development during the 1973-1979 period, measures tended to become noisy in the post-1979 period compared to direct estimates in section 4.2.

Because the dynamics of comparative advantage are important here, I focus on event study differences-in-differences estimates, rather than average differences-in-differences estimates.

Figure 9 shows that improved export performance emerged during the HCI drive, and only ascended fully in the years after the end of HCI. Before 1973, forward-linked sectors had essentially no comparative advantage over other downstream sectors. If anything, their revealed comparative advantage may have trended downwards. Post-1973, the pattern shifts: Table E7 shows that across RCA measures, comparative advantage climbs in forward-linked industries. Estimates for export performance become larger and significant for the 1973-1979 period and into the 1980s.

Building on the direct effects in panel A, panel B of Table E7 shows total linkages effects. Relatedly, total linkage effects have a strong impact on dynamic comparative advantage. Estimates for total forward linkages become significant in around 1976, growing in magnitude through the end of the series. Thus, both direct and total forward linkages with HCI industry correspond to the eventual comparative advantage of downstream industry.

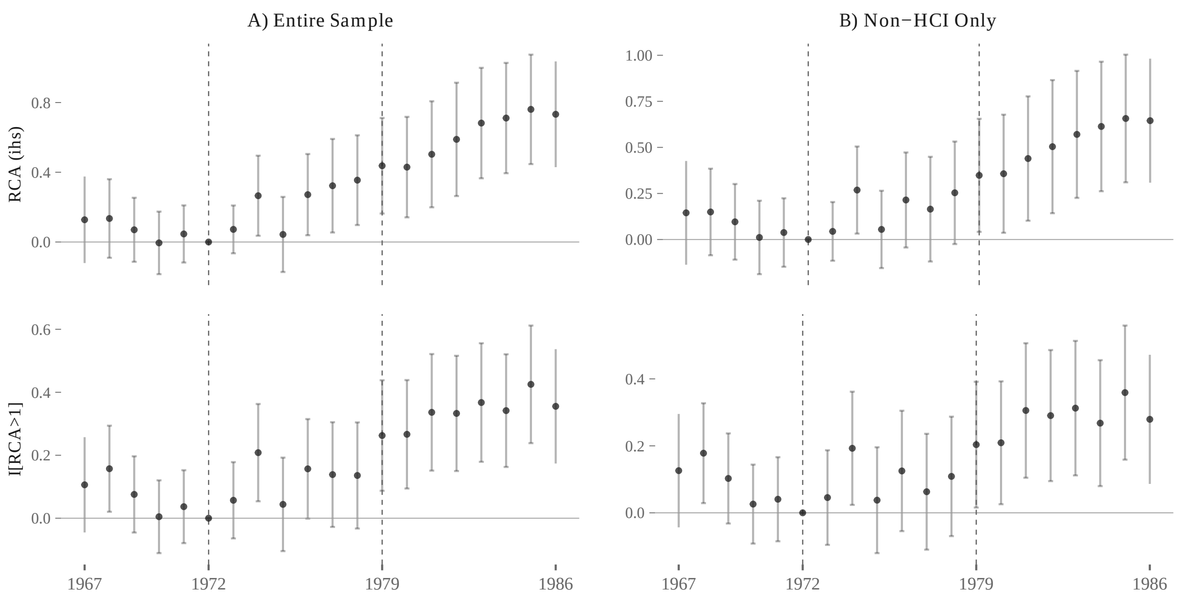
The emergence of comparative advantage among users of HCI products is even stronger when we consider *only* domestic linkages. Above, Table E7 provided estimates using linkages measures from the *general* 1970 input-output tables, which did not yet distinguish between domestic and imported flows. Online Appendix Table 1 shows estimates using domestic-only input-output flows, which were introduced in the 1975 input-output accounts. Although these domestic-only tables come after the 1973 HCI announcement and are endogenous to the policy, they reify the impact of domestic forward linkage effects on downstream comparative advantage.

Taken together, HCI coincides with improved export performance and the emergence of comparative advantage in downstream industry; that is, for downstream exporters most connected to HCI suppliers. These effects are robust across measures of RCA, as well as the types of forward linkages: direct, total, and domestic-only.

The positive evolution of downstream exporters is important for two reasons. First, these results show that HCI industrial policy may not only have promoted long-run development in (directly) targeted sectors, it may have a positive impact in external markets *after* the policy period. Though some external benefits of policy are contemporaneous, other external benefits, like those for downstream exporters, may take time to come to fruition.

Second, these results are consistent with the direct effects shown in section 4. Had HCI been unsuccessful in directly targeted sectors, it is likely that they would have *harmed* exporters—those sensitive to the competitive international market. This is particularly true where IP raises prices in targeted sectors, as in Blonigen (2016).

Figure 9: Impact of Direct Forward Linkages on the Evolution of Downstream Exports



Notes: Figure plots dynamic differences−in−differences estimates for the relationship between direct forward linkage exposure to HCI and outcomes: revealed comparative advantage (RCA). Top row is RCA (ihs). The bottom row is the probability that RCA is greater than 1. Estimates are relative to, 1972, the year before HCI. The year 1979 corresponds to collapse of Park regime. Years are on the x−axis. Estimates for the effect of direct forward (Linkage X Year) linkages are on y−axis. Full sample regressions control for the main HCI x Year effect. All regressions include controls for direct backward linkage connections, interacted with time. Regression tables in Appendix. 95 percent confidence interveals are shown in gray.

C) Forward-Linkage Mechanisms, Investment, and HCI Intermediates If HCI policy positively impacted downstream industry, it likely did so through inputs. I consider this mechanism by focusing on the use of intermediate goods and investment behavior in forward-linked industry.

To examine whether HCI benefited users of HCI inputs, I examine changes in the patterns of input use and investment in industries more versus less dependent on HCI goods. Figure 8 plots the differential evolution of input use and investment in downstream industry.

Before 1973, in Figure 8 differences in total materials and investment were converging between sectors with strong versus weak links. After 1973, this trend reverses. These differences jump for materials use (top row) and total gross fixed capital formation (bottom row) outcomes. This post-1973 divergence is seen in 4-digit data (panels A-B) and 5-digit data (panels C-D), and likewise is strong for the non-HCI sample.

Table E8 reports regression coefficients from Figure 8, and show the rise in materials use for the 1973-1979 period, with positive linkage effects after 1979. Post 1979, investment is particularly high in downstream sectors.

In addition total investment, Table E8 also presents investment in machinery. Equipment and machinery were particularly targeted by HCI industrial policy. Estimates in Table E8 show strong impacts of forward linkages on total fixed capital investment (3-4 and 11-12), and also for equipment investment. Investment for machines is particularly significant for the mid- to late-1970s.

Table 2 in the Online Appendix shows estimates using total forward linkages. If targeted HCI products were useful for downstream industry, then the cumulative impact of HCI inputs ought to similarly be useful. Estimates for total forward linkages in Table 2 in the Online Appendix show a positive impact for total forward linkages on materials and investments. All estimates are positive, and estimates are especially strong for materials and investment for 4-digit data. Thus, the same pattern seen in direct linkages also emerges for measures of total forward linkages.

In sum, the patterns above show that over the HCI period, downstream users of HCI inputs—those industries reliant more on targeted intermediates—expanded outlays and output during the drive. More precisely, those sectors with higher HCI exposure (through forward links) increased their intermediate materials use and investment in fixed capital. For the latter, the effects were strong for the machinery—a sector specifically targeted by HCI.

5.3.2 Network Results - Backward Linkages and Impact on Upstream Industry

Since at least Hirschman (1958), proponents of industrial policy emphasized that interventions promote spillovers through backward linkages. I show that in the context of the HCI drive, the spillovers from HCI to upstream suppliers may have been limited. In exploring the impacts of HCI on upstream industry, I suggest that HCI likely had the strongest impact through forward-linkage, or supply-side effects, rather than by supporting upstream demand.

In the HCI environment, the expansion of targeted sectors can have ambiguous impacts on backward-linked sectors. On one hand, growth in targeted industries may increase demand for inputs, thus transmitting shocks to upstream suppliers through backward linkages.

On the other hand, features of HCI industrial policy may limit the scope of these effects. For example, if targeted sectors are compelled to import inputs. For HCI, targeted sectors were provided import exemptions. Similarly, financial incentives increased the use of intermediates (shown in section 4.3), which were potentially imported. Alternatively, because HCI sectors tended to be more upstream (shown by Liu (2019) with this IO data), the extent of backward linkages effects may also be limited.

Figure F1 illustrates the ambiguous or negative impact of HCI on upstream industry output, measured by real value added. Importantly, Figure F1 shows direct linkage estimates, which reflect the extent of direct ties between suppliers and HCI sectors.

Before 1973, Figure F1 shows upstream industries with stronger direct links were already in decline relative to those with weaker direct links. Table F1 reports the full estimates from Fig. F1, alongside alternative specifications. Results in panel B (Table F1 show that backward-linked sectors were significantly different, and trending downward. Joint tests were strongest for the Non-HCI sample (column 4).

The downward trend among backward-linked sectors was not stopped by the ascent of downstream HCI industry in 1973. Figure F1 reports noisy effects of direct backward linkages on output during the HCI period. Table F1 shows—across samples and data—estimates for 1973-1979 are uniformly weak and negative. After 1979, negative estimates in Table F1 are amplified, becoming stronger through the 1980s. This relative decline is seen across estimates in Figure F1 for the 1980s.

Table F2 goes beyond the impact of HCI on direct suppliers, and considers measures of total n-degree connections. Unlike the direct effects in Table F1, total linkage effects are weak and ambiguous: small and weakly negative in 5-digit data (panel A), and weakly negative in 4-digit data (panel B). Thus, the effect of total linkages on upstream suppliers seems more ambiguous than direct linkages.

The average, overall impact of backward linkages on output are report in Table 7 for direct links, and Table **??** for total links. Coefficients on backward linkage estimates are much smaller than forward effects, which are shown in both tables. The average backward linkage estimates (Table 7) are weakly negative, but anemic. The total backward effects linkage effects tend more toward zero (Table E3).

Figure F2 highlights a potential reason for the lackluster impact of HCI on backward linked industry. One reason may be that HCI allowed targeted industry to expand their use of imported inputs.

If this is the case, I should observe a rise in imported goods that are used in HCI production. Thus, I rerun the same regression shown in Figure F1, but using import values as the outcome of interest, instead of the value of domestic output.

Figure F2 plots the results from this regression, and shows a large, but noisy, rise in imports for goods with higher backward links to HCI versus lower links. Put differently, I show an increase in imports more intensively used by HCI industry. The left of F1 reports estimates for direct linkages, while the right reports estimates for total Leontief linkages. The estimates in Figure F2 show that import competition, by virtue of HCI policy, may have dampened or limited HCI's benefit on upstream producers.

5.4 Networks: Discussion

Focusing on forward linkages—spillovers from targeted industry to downstream users of HCI products—and backward linkages—spillovers from targeted industry to suppliers of inputs to HCI production—the results above showed the power of downstream effects relative to upstream impacts. I show that HCI had positive impacts on the industrial development of downstream users. In other words, the benefits of HCI were passed on to users of HCI inputs, rather than through the power of building upstream demand.

This dovetails with work by Liu (2019), whose theoretical work shows that optimal targeting of industrial policy in the network may correspond to influential, upstream sectors (specifically, those with high "distortion centrality). Using input-output tables from this study, Liu showed that Korean HCI sectors correspond to this sufficient statistic for targeting. The differences-in-differences estimates herein show upstream targeting may propagate to downstream industries. Conversely, the potential of upstream sectors to transmit demand effects through backward linkages might be limited.[45]

That is, the development of key upstream, intermediate sectors may catalyze downstream users. I showed that these downstream users expanded outlays and outputs. Moreover, those with stronger forward linkages increased their use of inputs, like steel, and investment in intermediate capital goods targeted by HCI, like machinery.

These results align with spillovers effects emphasized by scholars of foreign direct investment, which has long explored the potential positive spillovers of FDI through linkages (Javorcik 2004b; Harrison and Rodríguez-Clare 2010). For example, the forward linkage results in the above paper share commonalities with the welfare-enhancing effects of FDI studied by Blalock and Gertler (2008) in Indonesia. Here, FDI improved productivity for upstream input producers, who in turn passed benefits on to downstream—and external—users of output.

6 Conclusion

This paper shows that HCI promoted industrial development in manufacturing sectors targeted by the policy. In addition, I show the industrial intervention had wide ramifications. First, the drive created positive effects in treated industries long after major elements of the policy were retrenched. Moreover, the regime's policy created both temporary *and* durable effects in sectors not directly targeted by policy. I show that in the case of export performance and comparative advantage, these effects were only fully realized after the policy had ended.

The role of industrial policy in the East Asian growth miracle has long been debated by economists (Rodrik, Grossman, and Norman 1995; Lal 1983; Krueger 1995). This study provides some of the first estimates on the impact of infant industry policy on industrial development. In doing so, I add to a nascent literature using historical, natural experiments to understand the foundations of industrial development (Juhasz 2018; Hanlon 2020; Giorcelli 2019; Mitrunen 2019).

I show real output in treated industries doubled, relative to non-targeted manufacturing industries during the policy period, while also fostering growth in export activity and significant drops in output prices. My study shows that, unlike IP in many places, realized HCI policies correspond to *de jure* industrial policy. In doing so, I hint that Korea IP relied on investment incentives and the availability of imported intermediates, rather than the overt protection of output markets. This is compatible with recent work importance of quality intermediates in industrial development (Goldberg et al. 2010; Verhoogen 2020).

I use the HCI context to study two important justifications for industrial policy: dynamic comparative advantage and spillovers. Using the assassination of President Park, which liberalized trade and capital markets, I show that the direct impact of industrial policy persisted long after the *de facto* end date of the policy. Importantly, my study provides evidence that targeted industries impacted external industries through the input-output network. I show the development of HCI goods—their expansion and decline in prices—benefited downstream industries dependent on HCI intermediates. Downstream producers with stronger (forward) links to treated sectors grew relatively more—in terms of output, plant entry, and employment—than downstream industries with weaker links.

For industry downstream from HCI, I also show evidence that sectors with stronger forward-linkages invested more in capital, especially those goods targeted by HCI (*e.g.* equipment) and increased outlays for

[45] This does not rule out the potential of other forms of backward linkages effects, like the technological spillovers emphasized in the FDI literature Javorcik (2004a).

intermediates. After the end of the policy in 1979, I show forward-linked sectors also attained competitive advantage as exporters—trends that were sown during the active years of the HCI drive.

This study turns to a key industrial intervention: South Korea's heavy industrial push. My findings correspond to aspects of qualitative arguments posed by Wade (1990) and Amsden (1992). The results in this study, however, emphasize rather conventional economic mechanisms and forces. The impacts of my study are nonetheless related to more conventional policy levers, such as investment incentives and the promotion of import intermediate inputs. These results update earlier work by Hirschman (1958) and others, indicating that the impacts of traditional policy prescriptions may be complex in a world with imported intermediate markets. Similarly, if upstream sectors are optimal nodes to target, this can limit the extent of demand effects through traditional backward linkages.

While my study highlights the impacts of industrial policy on industrial development outcomes, I have not delved into issues of total factor productivity and allocative efficiency, which I investigate deeper in an upcoming analysis. A next step for future research would be to fully account for the effects of industrial policy on the aggregate economy. Furthermore, the context of this study hints that successful IP depends on bureaucratic capacity (Johnson 1982; Evans 1995; Fukuyama 2014) and political incentive compatibility (Haggard 1990; Chibber 2002; Robinson 2010; Vu 2010). Such conditions may be rarely satisfied (Krueger 1990), indicating the importance of future work on the political economy of IP.

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Table 1: Estimates for Average Impact (ATT) of HCI on Development Outcomes, Before and After 1973

	Semiparametric DID Estimates		Linear DID Estimates	
	No Controls	With Controls	No Controls	With Controls
	(1)	(2)	(3)	(4)
Panel A) 5-Digit Panel 1970-1986				
Val. Ship	1.0238***	0.9475***	0.9625***	0.8302***
	[0.3254]	[0.2214]	(0.3047)	(0.1701)
Employment	0.6091**	0.5378***	0.5861**	0.4538***
	[0.2577]	[0.1822]	(0.2394)	(0.134)
Prices	-0.1575***	-0.1311***	-0.1974***	-0.1708***
	[0.0339]	[0.0268]	(0.0344)	(0.0279)
Labor Prod.	0.4829*	0.5118***	0.3637	0.335***
	[0.2578]	[0.1888]	(0.2285)	(0.1263)
Output Share	0.1124***	0.1398***	0.1225***	0.1375***
	[0.0291]	[0.0389]	(0.0309)	(0.0336)
Panel B) 4-Digit Panel 1967-1986				
Val. Ship	0.8391**	0.9412**	0.8824***	0.8174***
	[0.3346]	[0.4604]	(0.3136)	(0.305)
Employment	0.3369	0.5079	0.322	0.3331
	[0.2853]	[0.3225]	(0.2552)	(0.2552)
Prices	-0.1681***	-0.14***	-0.2456***	-0.2132***
	[0.0623]	[0.0528]	(0.0719)	(0.0579)
Labor Prod.	0.5203**	0.6298**	0.486**	0.4989**
	[0.2385]	[0.2742]	(0.1968)	(0.1896)
Output Share	0.2157***	0.2383**	0.2544***	0.2073***
	[0.0796]	[0.1181]	(0.088)	(0.0734)
Export	1.4136***	1.3513***	1.4713***	1.2817***
	[0.3042]	[0.3709]	(0.3541)	(0.3446)
Export Share	0.3333***	0.3282***	0.4501***	0.4359***
	[0.0926]	[0.0879]	(0.1174)	(0.1146)

Note:
Table reports many estimates of the average treatment effect on the treated (ATT). Each cell is a single DID estimate, from semiparametric DID (left column) estimator or analogous linear two-way fixed effect estimator (right column). Targeted is industry-level dummy variable (0 or 1 for HCI sectors). Panel A shows estimates using shorter, detailed 5-digit level industrial data (1970-1986). Panel B shows estimates using longer, aggregate 4-digit level industrial data (1967-1986). Val. Ship is the real value of output shipped. Employment is the total number of industry employment. Prices output price indices. Labor Prod. is real value added per worker. Output Share is the real manufacturing share of industry output. Export is the real (won) value of exports and Export Share is the manufacturing share of industry exports. Specifications without additional controls use industry and year effects. Specifications with controls include pre-1973 averages for avg. real plant wage, total cost, labor productivity, and output prices. Bootstrapped standard errors are in square brackets (10,000 iterations) and are adjusted to allow for within-industry correlation. Cluster robust standard errors (industry-level) are reported in brackets. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

Table 2: Estimates for Average Impact (ATT) of HCI on Export Development, Before and After 1973

	Semiparametric DID Estimates		Linear DID Estimates	
	No Controls	With Controls	No Controls	With Controls
	(1)	(2)	(3)	(4)
4-Digit SITC Data 1965-1986				
Rca	1.0697**	1.3187*	1.2963**	1.6365**
	[0.4798]	[0.7145]	(0.5357)	(0.7504)
Rca (IHS)	0.2325***	0.2558***	0.2761***	0.2975***
	[0.0675]	[0.0688]	(0.0728)	(0.0738)
Rca (Ln)	0.6719***	0.7248***	1.2562***	1.3062***
	[0.2217]	[0.2273]	(0.2207)	(0.2216)
I[Rca>1]	0.1224***	0.1296***	0.1424***	0.1463***
	[0.0393]	[0.0398]	(0.037)	(0.0365)

Note:
Table reports many estimates of the average treatment effect on the treated (ATT). Each cell is a single DID estimate, from semiparametric DID (left column) estimator or analogous linear two-way fixed effect estimator (right column). Targeted is industry-level dummy variable (0 or 1 for HCI sectors). Panel is SITC Rev. 1 goods data over the period 1965-1986. RCA is revealed comparative advantage index. RCA also normalized ihs and natural ln for completenes. Indicator I[RCA>1] is dummy equal to 1 when RCA>1, 0 otherwise Specifications without additional controls use industry and year effects. Specifications with controls include pre-1973 averages for avg. real plant wage, total cost, labor productivity, and output prices. Bootstrapped standard errors are in square brackets (10,000 iterations) and are adjusted to allow for within-industry correlation. Cluster robust standard errors (industry-level) are reported in brackets. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

Table 3: Estimates for Average Impact (ATT) of HCI on Export Development, Before and After 1973

	Semiparametric DID Estimates		Linear DID Estimates	
	No Controls	With Controls	No Controls	With Controls
	(1)	(2)	(3)	(4)
Panel A) 5-Digit Panel 1970-1986				
Material Cost	0.9701***	0.8092***	0.8724***	0.6585***
	[0.3274]	[0.2283]	(0.3029)	(0.171)
Invest. Total	0.7699***	0.6694***	0.778***	0.6538***
	[0.2708]	[0.2322]	(0.2399)	(0.2036)
Panel B) 4-Digit Panel 1967-1986				
Material Cost	0.7215**	0.8331*	0.5926*	0.5556*
	[0.3661]	[0.4574]	(0.2994)	(0.3046)
Invest. Total	0.1419	0.2256	0.308	0.3142
	[0.2937]	[0.2221]	(0.2561)	(0.213)

Note:
Table reports many estimates of the average treatment effect on the treated (ATT). Each cell is a single DID estimate, from semiparametric DID (left column) estimator or analogous linear two-way fixed effect estimator (right column). Targeted is industry-level dummy variable (0 or 1 for HCI sectors). Panel A shows estimates using shorter, detailed 5-digit level industrial data (1970-1986). Panel B shows estimates using longer, aggregate 4-digit level industrial data (1967-1986). Material Cost is real input material costs. Invest. Total is real total gross capital formation. Specifications without additional controls use industry and year effects. Specifications with controls include pre-1973 averages for avg. real plant wage, total cost, labor productivity, and output prices. Bootstrapped standard errors are in square brackets (10,000 iterations) and are adjusted to allow for within-industry correlation. Cluster robust standard errors (industry-level) are reported in brackets. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

Table 4: Differences in Industry-Level Trade Performance, HCI vs. Non-HCI Industry

	Outcomes - Trade flows (ihs)			
	Mfg. Share of Exports	Value of Exports	Mfg. Share of Imports	Value of Imports
	1	2	3	4
Targeted X 1967	-0.132	-0.007	0.020	0.252
	(0.100)	(0.309)	(0.118)	(0.259)
Targeted X 1968	-0.179	0.030	-0.022	0.176
	(0.098)	(0.279)	(0.095)	(0.223)
Targeted X 1969	-0.085	0.143	-0.072	-0.022
	(0.078)	(0.264)	(0.073)	(0.186)
Targeted X 1970	-0.096	-0.010	-0.056	-0.064
	(0.060)	(0.177)	(0.054)	(0.132)
Targeted X 1971	-0.121**	-0.072	-0.005	-0.040
	(0.043)	(0.159)	(0.032)	(0.074)
Targeted X 1972	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)
Targeted X 1973	-0.036	0.206	-0.178**	-0.162
	(0.041)	(0.195)	(0.058)	(0.142)
Targeted X 1974	0.066	0.627*	-0.080	0.018
	(0.066)	(0.281)	(0.067)	(0.155)
Targeted X 1975	0.003	0.465	-0.052	0.079
	(0.071)	(0.356)	(0.078)	(0.167)
Targeted X 1976	0.082	0.845**	-0.130	-0.048
	(0.077)	(0.305)	(0.076)	(0.174)
Targeted X 1977	0.233*	1.125**	-0.073	0.031
	(0.100)	(0.334)	(0.082)	(0.183)
Targeted X 1978	0.269**	1.202***	0.006	0.051
	(0.095)	(0.343)	(0.082)	(0.194)
Targeted X 1979	0.348***	1.315***	-0.011	0.091
	(0.090)	(0.340)	(0.089)	(0.208)
Targeted X 1980	0.435***	1.509***	-0.072	0.071
	(0.098)	(0.349)	(0.095)	(0.214)
Targeted X 1981	0.437***	1.457***	-0.094	0.113
	(0.115)	(0.345)	(0.107)	(0.219)
Targeted X 1982	0.515***	1.683***	-0.082	0.102
	(0.128)	(0.346)	(0.110)	(0.234)
Targeted X 1983	0.560***	1.766***	-0.071	0.066
	(0.143)	(0.354)	(0.113)	(0.240)
Targeted X 1984	0.584***	1.923***	-0.033	0.107
	(0.144)	(0.367)	(0.111)	(0.238)
Targeted X 1985	0.606***	1.996***	-0.055	0.008
	(0.151)	(0.384)	(0.114)	(0.241)
Targeted X 1986	0.573***	2.022***	-0.009	-0.004
	(0.132)	(0.362)	(0.100)	(0.235)
Industry Effect	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes
Baseline Controls	Yes	Yes	Yes	Yes
R-Squared	0.869	0.871	0.895	0.925
Observations	1720	1720	1720	1720
Clusters	86	86	86	86
Joint Test of Pre-Trend (F-Test)	3.043	0.399	0.914	0.700
Joint Test of Pre-Trend (P-Values)	0.014	0.848	0.476	0.625

Note:

Table shows dynamic differences-in-differences estimates for the relationship between Heavy Chemical and Industry Drive (HCI) targeting and industrial trade performance. Mfg. Share of Exports is an industry's manufacturing share of exports. Value of Exports is the real value of exports. Export Share is the industy share of manufacturing imports for each industry. Trade values are real won (2010 base).. Interactions correspond to interactions between Targeted dummy variable (0 or 1 for HCI sectors) and year effects (Targeted x Year). Estimates are relative to the baseline year, 1972, the year before HCI. Table shows estimates from linear two-way fixed effect estimates and include industry level and year effects. All specifications controls for pre-1973 averages for wages, firm size, total costs, and labor productivity (interacted with time effects). Panel is 4-digit industrial data (1967-1986).Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

* Source - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1967-1986, and UN-COMTRADE.

Table 5: Differences in Trade Policy, HCI vs. Non-HCI Industry, 1968-1982

	Outcomes: Levels								Outcomes: Differences			
	Tariff Rate				QRs Coverage				Tariffs Rate		QR Coverage	
	1	2	3	4	5	6	7	8	9	10	11	12
Panel A - Outcomes: Output Protection												
Targeted	-0.511***	-0.272*	-0.505***	-0.254	-0.269***	-0.182*	-0.249**	-0.173*	0.038	0.044	0.019	0.068
	(0.114)	(0.137)	(0.113)	(0.142)	(0.078)	(0.071)	(0.080)	(0.074)	(0.028)	(0.038)	(0.018)	(0.044)
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	X	X	X	X	X	X	X	X	X	X	X	X
Sample	Full	Full	Post-1973	Post-1973	Full	Full	Post-1973	Post-1973	Full	Full	Full	Full
Weighted	None	Weighted	None	Weighted	None	Weighted	None	Weighted	None	Weighted	None	Weighted
R-Squared	0.418	0.560	0.419	0.565	0.206	0.293	0.210	0.294	0.202	0.275	0.312	0.581
Observations	516	516	430	430	430	430	344	344	258	258	430	430
Clusters	86	86	86	86	86	86	86	86	86	86	86	86
Panel B - Outcomes: Exposure to Input Protection												
Targeted	-0.302*	-0.359*	-0.343**	-0.390*	-0.088**	-0.096**	-0.095***	-0.100**	-0.051***	-0.060***	-0.020	-0.015
	(0.116)	(0.149)	(0.120)	(0.154)	(0.028)	(0.033)	(0.027)	(0.032)	(0.014)	(0.018)	(0.010)	(0.012)
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	X	X	X	X	X	X	X	X	X	X	X	X
Sample	Full	Full	Post-1973	Post-1973	Full	Full	Post-1973	Post-1973	Full	Full	Full	Full
Weighted	None	Weighted	None	Weighted	None	Weighted	None	Weighted	None	Weighted	None	Weighted
R-Squared	0.163	0.226	0.145	0.207	0.224	0.320	0.248	0.331	0.261	0.360	0.262	0.251
Observations	516	516	430	430	430	430	344	344	430	430	258	258
Clusters	86	86	86	86	86	86	86	86	86	86	86	86

Note:
This table shows the relationship between trade policy and HCI (Targeted industries), using nominal trade policy data for the years 1968-1982. All regressions are at the 4-digit industry level. The first set of columns report results for regressions in levels. The second set of columns reports differences outcomes. Columns (1-4) report estimates for tariffs. Columns 5-8 reports estimates for quantitative restriction coverage (QR). Columns (9-10) shows estimates for changes in tariff rates. Columns (11-12) shows estimates for changes in tariff rates QRs. Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

[a] Panel A groups estimates for tariff and QR outcomes related to industry-level output market protection–the average level (or change) in tariff or QR coverage of a given output market. Panel B examines the industry-level exposure to tariffs vis-a-vis their input bundle. Input exposure is calculated using the weighted sum of QRs or tariffs for industry's input basket, with weights are taken from the 1970 input-output accounts. Sample refers to whether all five periods are used, or whether only post-HCI (1973) observations are used.

[*] Source - Tariffs rates and QR coverages, Luedde-Neurath (1986). Mining and Manufacturing Survey and Mining and Manufacturing Census: 1967-1986.

Table 6: Differences in Investment Responses to HCI, Across Asset and Inventory Class

	Capital investment by asset class (ihs)			Inventory investment (ihs), type		
	Machinery	Transp.Equip.	Structures	Invent./Ship.	Out.Invent.	Input Invent.
	1	2	3	4	5	6
Targeted X 1970	-0.240	-0.340	-0.404	-0.001	0.107	-0.542
	(0.296)	(0.257)	(0.290)	(0.011)	(0.309)	(0.283)
Targeted X 1971	0.039	-0.066	-0.269	-0.019	-0.132	-0.118
	(0.275)	(0.227)	(0.320)	(0.012)	(0.298)	(0.298)
Targeted X 1972	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)
Targeted X 1973	0.277	0.346	-0.046	0.006	1.231*	1.210*
	(0.252)	(0.234)	(0.295)	(0.016)	(0.475)	(0.468)
Targeted X 1974	0.423	0.284	-0.014	-0.004	0.686*	0.364
	(0.252)	(0.261)	(0.267)	(0.011)	(0.280)	(0.270)
Targeted X 1975	0.185	0.144	0.049	-0.003	0.358	-0.167
	(0.272)	(0.252)	(0.275)	(0.010)	(0.306)	(0.308)
Targeted X 1976	0.015	0.185	0.108	-0.002	0.434	0.022
	(0.307)	(0.286)	(0.307)	(0.010)	(0.326)	(0.320)
Targeted X 1977	0.582*	0.409	0.390	0.005	0.820**	0.252
	(0.275)	(0.266)	(0.295)	(0.011)	(0.312)	(0.296)
Targeted X 1978	0.863**	0.413	0.508	0.010	1.164*	0.336
	(0.308)	(0.273)	(0.296)	(0.014)	(0.494)	(0.633)
Targeted X 1979	0.776*	0.548*	0.537	0.001	1.515**	0.226
	(0.314)	(0.278)	(0.348)	(0.012)	(0.475)	(0.663)
Targeted X 1980	0.828**	0.304	0.605	0.005	-0.485	1.134
	(0.288)	(0.281)	(0.317)	(0.013)	(0.796)	(0.715)
Targeted X 1981	0.398	0.280	0.374	-0.002	1.031	0.979
	(0.293)	(0.269)	(0.322)	(0.012)	(0.762)	(0.792)
Targeted X 1982	0.601	0.269	0.294	0.008	1.924	-2.069*
	(0.324)	(0.290)	(0.349)	(0.011)	(0.987)	(0.994)
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	X	X	X	X	X	X
Controls	X	X	X	X	X	X
R-Squared	0.766	0.767	0.730	0.191	0.400	0.385
Observations	3094	3094	3094	3040	3107	3107
Clusters	238	238	238	239	239	239
Joint Test of Pre-Trend (F-Test)	0.502	1.044	0.991	2.091	0.262	1.886
Joint Test of Pre-Trend (P-Values)	0.606	0.354	0.373	0.126	0.770	0.154

Note:

Table shows dynamic differences-in-differences estimates for the relationship between Heavy Chemical and Industry Drive (HCI) targeting and across investment asset class and type of inventory investment. Machinery Equip. is value (real gross) investment in equipment and machinery. Transportation Equip. is value (real gross) investment in vehicle and transportation equipment. Structures are value (real gross) investment in building and structures. Invent./Ship. are changes in the real value of product inventories divided by value of shipments. Output Inventory is the change in real value of product inventories. Input Inventory is the change in real value of intermediate inventories.. Interactions correspond to interactions between Targeted dummy variable (0 or 1 for HCI sectors) and year effects (Targeted x Year). Estimates are relative to the baseline year, 1972, the year before HCI. Table shows estimates from linear two-way fixed effect estimates and include industry level and year effects. All specifications controls for pre-1973 averages for wages, firm size, total costs, and labor productivity (interacted with time effects). Panel is 4-digit industrial data (1967-1986).Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

* Source - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1970-1986.

Table 7: Average Impact of Linkages on Output, Before and After 1973

	Outcome - Real value added (ihs)							
	Panel A) 5-Digit Panel, 1970 - 1986				Panel B) 4-Digit Panel, 1967 - 1986			
	Full Sample		*Non-HCI Sample*		*Full Sample*		*Non-HCI Sample*	
	1	2	3	4	1	2	3	4
Post X Forward Link	0.0216**	0.0235**	0.0214*	0.0229*	0.0134	0.0166*	0.0114	0.0134
	(0.00699)	(0.00759)	(0.00975)	(0.0103)	(0.00698)	(0.00642)	(0.0100)	(0.00918)
Post X Backward Link	-0.0169*	-0.0163*	-0.0204*	-0.0192*	-0.0115	-0.0117	-0.0249***	-0.0251***
	(0.00695)	(0.00697)	(0.00885)	(0.00879)	(0.00718)	(0.00758)	(0.00716)	(0.00696)
Industry Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Targeted X Year	Yes	Yes	No	No	Yes	Yes	No	No
Network Controls	No	Yes	No	Yes	No	Yes	No	Yes
R-Squared	0.765	0.766	0.766	0.769	0.827	0.831	0.809	0.815
Observations	4726	4726	3111	3111	1760	1760	1180	1180
Clusters	278	278	183	183	88	88	59	59

Note:
Average differences-in-differences estimates, before and after 1973. Regressions interact linkage measure with Post 1973 indicator. For these estimates, both linkage interactions are shown (forward and backward); whereas, dynamic estimates presented only linkages for the interaction of interest (forward or backward). Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

[*] Source for Panel A - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1970-1986.

[†] Source for Panel B - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1967-1986.

Table 8: Average Impact of Linkages on Output Prices, Before and After 1973

	Outcome - Output prices (ihs)							
	Panel A) 5-Digit Panel, 1970 - 1986				Panel B) 4-Digit Panel, 1967 - 1986			
	Full Sample		*Non-HCI Sample*		*Full Sample*		*Non-HCI Sample*	
	1	2	3	4	1	2	3	4
Post X Forward Link	-0.00264**	-0.00339***	-0.00252*	-0.00334***	-0.00331*	-0.00429**	-0.00242	-0.00324*
	(0.00100)	(0.000983)	(0.00104)	(0.000994)	(0.00144)	(0.00145)	(0.00145)	(0.00140)
Post X Backward Link	0.00353***	0.00333***	0.00370***	0.00353***	0.00591**	0.00561**	0.00878**	0.00854**
	(0.000529)	(0.000519)	(0.000476)	(0.000463)	(0.00210)	(0.00204)	(0.00288)	(0.00268)
Industry Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Targeted X Year	Yes	Yes	No	No	Yes	Yes	No	No
Network Controls	No	Yes	No	Yes	No	Yes	No	Yes
R-Squared	0.951	0.953	0.941	0.943	0.955	0.956	0.948	0.951
Observations	4722	4722	3107	3107	1751	1751	1177	1177
Clusters	278	278	183	183	88	88	59	59

Note:
Average differences-in-differences estimates, before and after 1973. Regressions interact linkage measure with Post 1973 indicator. For these estimates, both linkage interactions are shown (forward and backward); whereas, dynamic estimates presented only linkages for the interaction of interest (forward or backward). Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level. All specifications are unweighted.

[*] Source for Panel A - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1970-1986.

[†] Source for Panel B - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1967-1986.

Table 9: Impact of Direct Forward Linkages on Downstream Industrial Development Outcomes

	A) 5-Digit Panel, 1970 - 1986								B) 4-Digit Panel, 1967 - 1986							
	Employment		Avg. Wage.		Num. Plants		Labor Prod.		Employment		Avg. Wage.		Num. Plants		Labor Prod.	
	Full	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1967 X Forward Link									0.00215	-0.000481	0.00273	0.0113	0.00371	0.00172	0.00504	0.0108
									(0.00526)	(0.00772)	(0.00726)	(0.00981)	(0.00411)	(0.00481)	(0.00567)	(0.00798)
1968 X Forward Link									0.00536	0.00389	0.00452	0.0146	0.00560	0.00395	0.00803	0.0157*
									(0.00494)	(0.00765)	(0.00672)	(0.00887)	(0.00370)	(0.00461)	(0.00519)	(0.00755)
1969 X Forward Link									0.00611	0.00564	0.00204	0.0141	0.00389	0.000784	0.00851	0.0188
									(0.00471)	(0.00756)	(0.00649)	(0.00839)	(0.00438)	(0.00577)	(0.00715)	(0.0109)
1970 X Forward Link	-0.00244	0.000379	0.00378	0.00383	-0.00234	-0.00211	-0.00246	-0.00880	-0.00488	-0.00465	0.00135	0.00152	-0.00240	-0.00394*	0.00499	0.00501
	(0.00380)	(0.00419)	(0.00345)	(0.00414)	(0.00157)	(0.00183)	(0.00664)	(0.00923)	(0.00370)	(0.00293)	(0.00156)	(0.00200)	(0.00195)	(0.00168)	(0.00283)	(0.00407)
1971 X Forward Link	-0.00540	-0.00383	-0.00269	-0.00312	-0.00349*	-0.00330	-0.00371	-0.00358	-0.00124	-0.00236	0.00117	0.00260	-0.00213	-0.00271	0.00224	0.00346
	(0.00370)	(0.00492)	(0.00418)	(0.00596)	(0.00152)	(0.00199)	(0.00483)	(0.00718)	(0.00304)	(0.00332)	(0.00338)	(0.00576)	(0.00154)	(0.00167)	(0.00241)	(0.00326)
1972 X Forward Link	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
1973 X Forward Link	-0.00167	-0.000518	-0.000170	-0.00106	-0.000140	0.000724	-0.00214	-0.00450	-0.000286	-0.00202	0.00254	0.00283	0.00141	0.00143	-0.00230	-0.00343
	(0.00330)	(0.00385)	(0.00279)	(0.00292)	(0.00115)	(0.00153)	(0.00414)	(0.00497)	(0.00181)	(0.00216)	(0.00159)	(0.00214)	(0.00116)	(0.00156)	(0.00250)	(0.00378)
1974 X Forward Link	-0.000306	0.00330	0.00265	0.00287	0.00202	0.00348	0.00261	0.00277	0.00244	0.00172	0.00556	0.00788	0.00267	0.00251	0.00538	0.00658
	(0.00320)	(0.00363)	(0.00343)	(0.00433)	(0.00156)	(0.00217)	(0.00417)	(0.00515)	(0.00203)	(0.00320)	(0.00408)	(0.00706)	(0.00158)	(0.00228)	(0.00361)	(0.00597)
1975 X Forward Link	0.0122*	0.0131	0.0106	0.00397	0.00940**	0.0118**	0.0114	0.00315	0.0127*	0.0180*	0.00653	0.00737	0.0118***	0.0156***	0.00164	0.000451
	(0.00566)	(0.00789)	(0.00660)	(0.00655)	(0.00311)	(0.00437)	(0.00778)	(0.00790)	(0.00495)	(0.00736)	(0.00561)	(0.00939)	(0.00317)	(0.00439)	(0.00521)	(0.00856)
1976 X Forward Link	0.0214**	0.0262**	0.0178*	0.0146	0.0130***	0.0182***	0.0200*	0.0168	0.0168*	0.0204	0.00934	0.00937	0.0174***	0.0235***	0.00438	0.00306
	(0.00659)	(0.00913)	(0.00760)	(0.00885)	(0.00331)	(0.00438)	(0.00891)	(0.0106)	(0.00694)	(0.0103)	(0.00641)	(0.00942)	(0.00461)	(0.00600)	(0.00609)	(0.00885)
1977 X Forward Link	0.0257***	0.0309**	0.0214**	0.0192*	0.0139***	0.0187***	0.0255**	0.0226*	0.0209**	0.0264*	0.0148	0.0179	0.0191***	0.0260***	0.0102	0.0119
	(0.00695)	(0.0100)	(0.00793)	(0.00946)	(0.00345)	(0.00459)	(0.00934)	(0.0113)	(0.00768)	(0.0120)	(0.00851)	(0.0139)	(0.00487)	(0.00653)	(0.00772)	(0.0125)
1978 X Forward Link	0.0176**	0.0192*	0.0151*	0.00894	0.0124***	0.0162***	0.0176*	0.0103	0.0197*	0.0250*	0.0177*	0.0205	0.0197***	0.0272***	0.0118	0.0135
	(0.00626)	(0.00871)	(0.00734)	(0.00794)	(0.00359)	(0.00472)	(0.00865)	(0.00952)	(0.00771)	(0.0116)	(0.00872)	(0.0142)	(0.00501)	(0.00684)	(0.00785)	(0.0127)
1979 X Forward Link	0.0208**	0.0204*	0.0191*	0.0120	0.0139***	0.0163***	0.0215*	0.0147	0.0202**	0.0243*	0.0184*	0.0207	0.0201***	0.0274***	0.0146	0.0171
	(0.00672)	(0.00865)	(0.00802)	(0.00876)	(0.00352)	(0.00460)	(0.00923)	(0.0102)	(0.00724)	(0.0109)	(0.00890)	(0.0145)	(0.00487)	(0.00644)	(0.00804)	(0.0132)
1980 X Forward Link	0.0223**	0.0247*	0.0187*	0.0117	0.0147***	0.0186***	0.0209*	0.0146	0.0203*	0.0274*	0.0188*	0.0207	0.0204***	0.0282***	0.0129	0.0152
	(0.00702)	(0.00993)	(0.00798)	(0.00924)	(0.00365)	(0.00471)	(0.00930)	(0.0111)	(0.00805)	(0.0125)	(0.00910)	(0.0146)	(0.00509)	(0.00654)	(0.00820)	(0.0135)
1981 X Forward Link	0.0209**	0.0210*	0.0188*	0.0121	0.0157***	0.0177***	0.0204*	0.0129	0.0190*	0.0246*	0.0197*	0.0225	0.0199***	0.0267***	0.0131	0.0157
	(0.00657)	(0.00917)	(0.00803)	(0.00950)	(0.00382)	(0.00499)	(0.00942)	(0.0114)	(0.00757)	(0.0110)	(0.00942)	(0.0149)	(0.00516)	(0.00657)	(0.00843)	(0.0138)
1982 X Forward Link	0.0242***	0.0281**	0.0234**	0.0198	0.0170***	0.0208***	0.0258**	0.0222	0.0219*	0.0287*	0.0213*	0.0245	0.0222***	0.0296***	0.0143	0.0174
	(0.00703)	(0.0102)	(0.00820)	(0.0102)	(0.00390)	(0.00505)	(0.00963)	(0.0123)	(0.00838)	(0.0126)	(0.00947)	(0.0152)	(0.00536)	(0.00703)	(0.00897)	(0.0148)
1983 X Forward Link	0.00754	0.0128	0.00240	0.000508	0.0117**	0.0167**	0.00214	-0.000575	0.0125*	0.0101	0.0110*	0.00746	0.0188***	0.0217***	0.00346	-0.000187
	(0.00716)	(0.00903)	(0.00623)	(0.00821)	(0.00440)	(0.00542)	(0.00735)	(0.00981)	(0.00522)	(0.00727)	(0.00465)	(0.00550)	(0.00451)	(0.00513)	(0.00343)	(0.00434)
1984 X Forward Link	0.0103	0.0153	0.00517	0.000447	0.0126**	0.0178**	0.00420	-0.00119	0.0137**	0.0110	0.0109*	0.00807	0.0194***	0.0228***	0.00332	-0.000349
	(0.00801)	(0.00978)	(0.00616)	(0.00811)	(0.00470)	(0.00585)	(0.00730)	(0.00977)	(0.00510)	(0.00700)	(0.00473)	(0.00548)	(0.00481)	(0.00534)	(0.00354)	(0.00435)
1985 X Forward Link	0.00633	0.0128	0.00128	-0.00169	0.0119*	0.0178**	0.000500	-0.00298	0.0138*	0.0125	0.0119*	0.0104	0.0204***	0.0239***	0.00480	0.00319
	(0.00827)	(0.00994)	(0.00641)	(0.00823)	(0.00489)	(0.00596)	(0.00758)	(0.0101)	(0.00538)	(0.00696)	(0.00560)	(0.00740)	(0.00494)	(0.00553)	(0.00418)	(0.00599)
1986 X Forward Link	0.0124	0.0201	0.00590	0.00222	0.0139**	0.0197**	0.00554	0.00242	0.0152**	0.0145*	0.0120*	0.0111	0.0210***	0.0239***	0.00495	0.00335
	(0.00848)	(0.0106)	(0.00650)	(0.00873)	(0.00505)	(0.00605)	(0.00764)	(0.0106)	(0.00574)	(0.00722)	(0.00549)	(0.00724)	(0.00519)	(0.00577)	(0.00415)	(0.00586)
Industry Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Targeted X Year	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
R-Squared	0.788	0.808	0.640	0.625	0.857	0.870	0.635	0.621	0.848	0.854	0.732	0.675	0.888	0.898	0.753	0.710
Observations	4726	3111	4726	3111	4726	3111	4726	3111	1760	1180	1760	1180	1760	1180	1760	1180
Clusters	278	183	278	183	278	183	278	183	88	59	88	59	88	59	88	59
Joint Test of Pre-Trend (F-Test)	1.496	1.254	1.892	1.252	2.608	4.180	0.403	0.876	2.169	3.734	1.633	5.968	1.370	5.109	1.581	1.983
Joint Test of Pre-Trend (P-Values)	0.204	0.290	0.112	0.291	0.036	0.003	0.807	0.479	0.027	0.001	0.110	0.000	0.208	0.000	0.126	0.052

Note:

Table shows dynamic differences-in-differences estimates for the relationship between forward direct linkage exposure to HCI and industrial development outcomes. (Real) Shipments are an altenative, gross measure of output. Num. Plants are the number of plants operating in an an industry. Value Exports are real (Won) value of exports. Labor Productivity is value added per worker. Estimates are relative to 1972, the year before HCI. 1979 corresponds to collapse of Park regime. Panel A reports estimates from detailed 5-digit industrial data (1970-1986). Panel B reports estimates from longer 4-digit level industrial data (1967-1986). Specificiations are two-way fixed effect OLS estimates, and include year and industry effects. All regressions include controls for backward direct interacted with time. Network controls are 1970 eigenvalue centrality and total network degrees (1970) interacted with time. Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

[*] Source for Panel A - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1970-1986.

[†] Source for Panel B - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1967-1986.

Appendix

Table A1: Pre-HCI Drive Statistics Across Manufacturing Industry - By Panel and Treatment

		A) 4-Digit Panel 1967-1972			B) 5-Digit Panel 1970-1972		
HCI	Variable	Mean	Stdev.	Obs.	Mean	Stdev.	Obs.
i. Industrial Statistics							
Non-HCI	Average Size	2.81	3.73	1180	2.81	2.86	3111
HCI	Average Size	2.34	2.00	580	2.46	2.27	1615
Non-HCI	Costs	486380.67	782366.73	1180	139507.36	313009.85	3111
HCI	Costs	1006636.14	2092000.36	580	267638.53	766298.73	1615
Non-HCI	Establishments	442.92	635.98	1180	126.74	261.93	3111
HCI	Establishments	284.28	371.22	580	92.83	137.15	1615
Non-HCI	Gross Output	696712.59	1072556.26	1180	256926.77	579862.85	3111
HCI	Gross Output	1144931.83	2761979.92	580	400072.62	1260235.61	1615
Non-HCI	Investment	18283.96	32977.69	1180	9262.60	23177.12	3111
HCI	Investment	43713.76	113854.10	580	19606.86	58862.08	1615
Non-HCI	Labor Productivity	1735.10	3177.95	1180	1538.47	2368.45	3111
HCI	Labor Productivity	2412.79	5364.54	580	1982.37	3150.12	1615
Non-HCI	Prices	28.03	23.63	1180	32.56	26.15	3111
HCI	Prices	46.70	49.91	580	48.04	48.68	1615
Non-HCI	Shipments	687847.08	1059938.88	1180	253653.63	572877.84	3111
HCI	Shipments	1128595.62	2746062.60	580	394791.54	1255021.14	1615
Non-HCI	Value Added	291781.53	477598.90	1180	106916.59	270509.06	3111
HCI	Value Added	346778.71	769766.77	580	126333.87	322466.70	1615
Non-HCI	Workers	21003.36	33129.56	1180	6882.79	15659.36	3111
HCI	Workers	18681.43	29562.49	580	6755.78	15743.39	1615
ii. Direct Linkage Measures							
Non-HCI	Backward, Upstream From Targeted	8.35	15.04	1180	12.47	24.11	3111
HCI	Backward, Upstream From Targeted	15.20	20.87	580	17.51	20.04	1615
Non-HCI	Forward, Downstream From Targeted	20.81	17.43	1180	19.70	15.95	3111
HCI	Forward, Downstream From Targeted	46.85	19.48	580	51.24	18.28	1615
iii. Trade Statistics							
Non-HCI	Trade Value Imports (Log)	3.21	2.68	1180			
HCI	Trade Value Imports (Log)	5.39	2.22	580			
Non-HCI	Trade Value Exports (Log)	2.79	3.76	1180			
HCI	Trade Value Exports (Log)	3.85	2.94	580			
Non-HCI	Tariff	50.90	28.19	1180			
HCI	Tariff	31.04	13.59	580			
Non-HCI	Quantitative Restrictions	0.94	0.61	1180			
HCI	Quantitative Restrictions	0.59	0.41	580			

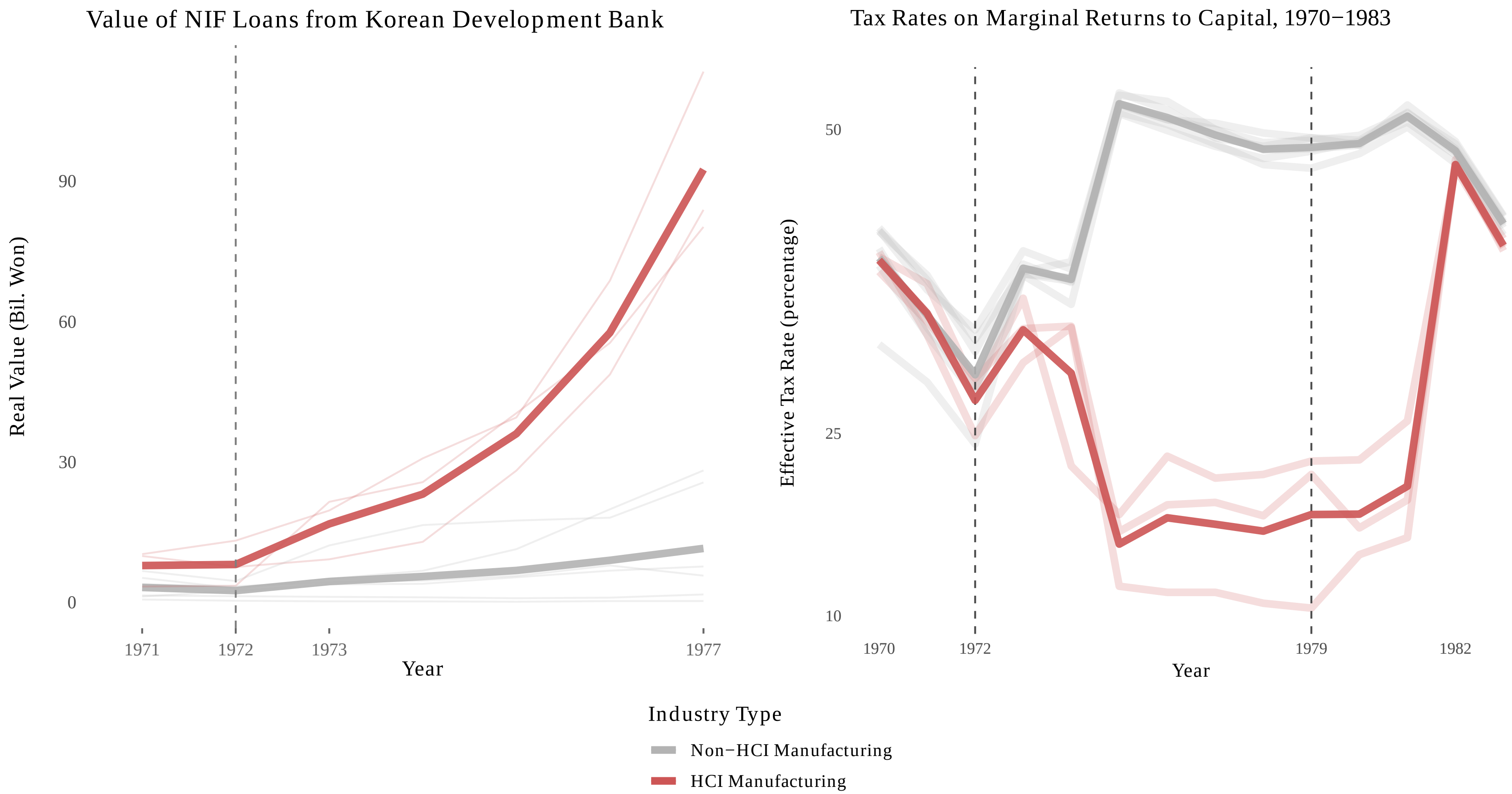
Note:
Table reports pre-1973 statistics for a selection of core industrial variables. Panel A shows statistics for aggregated ('long') 4-digit industrial panel, 1967 to 1972. Panel B shows statistics for disaggregated ('short') 5-digit industrial panel, 1970 to 1972. Raw (non-normalized) values are shown. Part i) of table reports Mining and Manufacturing Survey/Census outcomes. With the exception of prices, which come from the Bank of Korea publications. Part ii) shows data from the 1970 input-output tables published by the Bank of Korea (1970), harmonized and matched to industry-level data. Part iii) shows trade (UN-COMTRADE) variables, harmonized and matched to 4-digit industry-level data. Trade policy variables are also shown: tariffs and quantitative restrictions (QRs). Tariffs are reported as ad velorum rates. QRs, are coverage scores of industry restrictions: lowest (0) to highest (3) (Luedde-Neurath 1986). All values, including trade values, have been converted to real Won (base year = 2010).

Table A2: Normalized Names for Treated Industries - Harmonized 5-Digit Level Industries

Chemical fibres	Metal working machinery	Hydrochloric acid
Petroleum synthetic resins	Food products machinery	Other sodium products
Polyvinyl chlorides	Mining and construction machinery	Soda ash
Thermosetting resins	Other special industry machinery	Sulfuric acid
Paints and allied products	Textile machinery	Anhydrous ammonia
Pigments	Office and service industry machines	Other industrial compressed gases
Soap and surface active agents	Household electric appliances	Other inorganic chemicals
Miscellaneous chemical products	Refrigerators and other household appliances	Miscellaneous organic chemicals
Processed edible oil products and fats	Generators and motors	Processed oils and fats products
Briquettes	Other electric transmission and distribution equipmnet	Nitrogenous fertilizers
Dry distillated coal products	Other electrical industrial apparatus	Phosphatic fertilizers
Other petroleum products	Transformers	Calcium cyanamide
Ferroalloys	Communications equipment	Other chemical fertilizers
Pig iron	Electronic components	Soap and active agents
Raw steel	Radio and television sets	Adhesives
Copper	Electric lamps	Explosives and products
Gold and silver ingots	Insulated wire and cable	Matches
Other non-ferrous metal ingots	Other electrical equipment and supplies	Photochemical and sensitized materials
Household metal products	Storage and primary batteries	Miscellaneous metal products
Tools	Railroad transportation equipment	General industrial machinery
Metal furniture	Automobile repair	General machinery parts
Structural metal products	Motor vehicle parts	Sewing machines
Wire products	Motor vehicles	Steel ships
Boilers	Measuring and scientific instruments	Ships, NEC
Prime movers	Medical, surgical and dental instruments	Cosmetics and tooth paste and powder
Farm machinery	Calcium carbide	Synthetic dyestuffs
Machine tools for working metals	Caustic soda	

Source notes:
Sample list of Korean industry names under HCI. Industry names are based on the 1970 Bank of Korea industry labels, as they are most consistent through time. Names are not exact, due to harmonization of codes through times, and represent best representative strings from crosswalked industrial codes. Heuristically, the term 'Heavy and Chemical Industry' (as well as HCI) is also used to define a specific set of sectors in Korea statistical publications. This more general nomeclature, however, does not encompass the electronics industry. Hence, there is a distinction between the term 'heavy industry' as it is used in statistical publications and its specific use in HCI policy plans. As Suk-Chae Lee explains, the electronics industry 'was one of the core industries slated for promotion in Korea's HCI Plan [May, 1973]; therefore any analysis of the HCI plan should include the electronics industry' [Lee 1992; p.432].

Figure A1: Example of State Lending and Subsidies During HCI Period, by Industry



Notes: Left − Plots the value of loans provided by the Korea Development Bank during the HCI period, the primary lender of NIF funds. Gray lines correspond to non−targeted sectors and red lines correspond to targeted sectors. NIF provided discounted financing for equipment investment and factory construction, and loans were provided through commercial banks. Right − Plots estimates of the average effective tax rate (percentage) on the returns of capital, accounting for changes in industry−specific subsidies. Average rates were calculated for aggregate 2−digit manufacturing industries (thin lines). Thick lines show the average rates by treated and non−treated industries.

Table B1: Differences in Industrial Output Growth, HCI vs. Non-HCI, Relative to 1972

	Outcomes: Measures of real output, gross and value added (ihs)											
	Panel A) 5-Digit Panel, 1970 - 1986						Panel B) 4-Digit Panel, 1967 - 1986					
	Val. Ship	Val. Ship	Gross Out.	Gross Out.	Value Add.	Value Add.	Val. Ship	Val. Ship	Gross Out.	Gross Out.	Value Add.	Value Add.
	1	2	3	4	5	6	1	2	3	4	5	6
Targeted X 1967							-0.141	-0.075	-0.157	-0.093	-0.184	-0.117
							(0.301)	(0.296)	(0.301)	(0.296)	(0.296)	(0.295)
Targeted X 1968							-0.039	-0.001	-0.038	-0.002	-0.085	-0.027
							(0.287)	(0.280)	(0.288)	(0.281)	(0.282)	(0.278)
Targeted X 1969							-0.025	-0.035	-0.015	-0.028	0.248	0.261
							(0.279)	(0.268)	(0.279)	(0.268)	(0.376)	(0.387)
Targeted X 1970	0.091	0.137	0.238	0.264	0.206	0.239	-0.041	-0.055	0.163	0.112	0.221	0.189
	(0.175)	(0.198)	(0.219)	(0.252)	(0.198)	(0.228)	(0.267)	(0.244)	(0.245)	(0.243)	(0.215)	(0.217)
Targeted X 1971	0.093	0.060	0.274	0.256	0.221	0.194	-0.014	-0.017	0.199	0.131	0.200	0.144
	(0.184)	(0.213)	(0.193)	(0.224)	(0.169)	(0.196)	(0.238)	(0.244)	(0.245)	(0.239)	(0.208)	(0.201)
Targeted X 1972	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
Targeted X 1973	0.556**	0.614**	0.608**	0.673**	0.662***	0.747***	0.297	0.191	0.255	0.142	0.413*	0.283
	(0.188)	(0.213)	(0.189)	(0.215)	(0.189)	(0.205)	(0.208)	(0.193)	(0.213)	(0.199)	(0.192)	(0.175)
Targeted X 1974	0.561**	0.673***	0.510**	0.610**	0.468**	0.574**	0.195	0.095	0.272	0.167	0.136	0.054
	(0.173)	(0.197)	(0.167)	(0.188)	(0.158)	(0.178)	(0.167)	(0.145)	(0.196)	(0.180)	(0.167)	(0.149)
Targeted X 1975	0.616	0.449	0.650	0.483	0.585	0.447	0.268	0.232	0.264	0.227	0.154	0.121
	(0.362)	(0.258)	(0.366)	(0.263)	(0.333)	(0.244)	(0.269)	(0.234)	(0.269)	(0.234)	(0.254)	(0.224)
Targeted X 1976	0.751	0.504	0.754	0.502	0.720	0.505	0.708	0.609	0.709	0.609	0.619	0.538
	(0.410)	(0.294)	(0.411)	(0.294)	(0.371)	(0.268)	(0.398)	(0.423)	(0.396)	(0.422)	(0.360)	(0.380)
Targeted X 1977	1.024*	0.810**	1.030*	0.817**	0.938*	0.751**	0.723	0.762	0.724	0.765	0.651	0.704*
	(0.414)	(0.272)	(0.414)	(0.271)	(0.376)	(0.245)	(0.391)	(0.389)	(0.390)	(0.389)	(0.356)	(0.346)
Targeted X 1978	1.097**	0.933***	1.120**	0.951***	1.007**	0.867***	0.871*	0.893*	0.882*	0.905*	0.763*	0.795*
	(0.408)	(0.272)	(0.410)	(0.272)	(0.378)	(0.253)	(0.408)	(0.408)	(0.408)	(0.408)	(0.378)	(0.371)
Targeted X 1979	1.455***	1.207***	1.456***	1.209***	1.310**	1.121***	0.980*	0.992*	0.982*	0.994*	0.856*	0.901*
	(0.434)	(0.298)	(0.435)	(0.297)	(0.400)	(0.279)	(0.410)	(0.411)	(0.411)	(0.411)	(0.381)	(0.368)
Targeted X 1980	0.974*	0.946***	0.984*	0.970***	0.919*	0.933***	0.884*	0.887*	0.914*	0.931*	0.849*	0.903*
	(0.413)	(0.255)	(0.413)	(0.255)	(0.379)	(0.237)	(0.394)	(0.390)	(0.394)	(0.388)	(0.362)	(0.345)
Targeted X 1981	1.059*	1.040***	1.060*	1.040***	1.000**	1.016***	0.989*	0.993*	0.989*	0.993*	0.900*	0.921*
	(0.412)	(0.258)	(0.412)	(0.258)	(0.376)	(0.240)	(0.423)	(0.425)	(0.424)	(0.425)	(0.394)	(0.388)
Targeted X 1982	0.924*	0.985***	0.932*	0.998***	0.841*	0.937***	1.018*	1.075*	1.019*	1.077*	0.934*	1.033*
	(0.421)	(0.277)	(0.422)	(0.280)	(0.388)	(0.259)	(0.454)	(0.436)	(0.454)	(0.436)	(0.431)	(0.400)
Targeted X 1983	1.294**	1.049***	1.294**	1.049***	1.163**	0.983**	1.212**	1.032*	1.211**	1.030*	1.153**	1.022**
	(0.421)	(0.309)	(0.423)	(0.310)	(0.392)	(0.296)	(0.427)	(0.398)	(0.427)	(0.398)	(0.411)	(0.373)
Targeted X 1984	1.332**	1.006***	1.335**	1.008***	1.255**	0.969***	1.300**	1.121**	1.310**	1.130**	1.264**	1.131**
	(0.421)	(0.297)	(0.422)	(0.298)	(0.394)	(0.283)	(0.438)	(0.408)	(0.438)	(0.409)	(0.419)	(0.380)
Targeted X 1985	1.361**	1.100**	1.355**	1.095**	1.262**	1.059**	1.142*	1.060*	1.133*	1.053*	1.060*	1.019*
	(0.454)	(0.360)	(0.455)	(0.361)	(0.425)	(0.343)	(0.439)	(0.427)	(0.439)	(0.426)	(0.422)	(0.400)
Targeted X 1986	1.330**	1.231***	1.327**	1.223***	1.267**	1.186***	1.160*	1.076*	1.158*	1.076*	1.088*	1.038*
	(0.448)	(0.335)	(0.449)	(0.335)	(0.420)	(0.320)	(0.456)	(0.439)	(0.457)	(0.440)	(0.443)	(0.416)
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Baseline Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-Squared	0.763	0.745	0.761	0.740	0.762	0.745	0.830	0.806	0.831	0.806	0.825	0.803
Observations	4726	4063	4726	4063	4726	4063	1760	1720	1760	1720	1760	1720
Clusters	278	239	278	239	278	239	88	86	88	86	88	86
Joint Test of Pre-Trend (F-Test)	0.162	0.270	1.077	0.798	0.948	0.706	0.242	0.135	0.537	0.276	0.828	0.579
Joint Test of Pre-Trend (P-Values)	0.851	0.763	0.342	0.452	0.389	0.495	0.943	0.984	0.748	0.925	0.533	0.716

Note:

Table shows dynamic differences-in-differences estimates for the relationship between Heavy and Chemical Industry Drive (HCI) industrial policy and industrial output–for gross and value added measures. Three different measures of output are reported: real value shipped, real gross output, and real value added, and are deflated using industrial price indices.. Targeted x Year correspond to the interaction between treatment indicator (0 or 1 for HCI industry) and year effects; coefficient estimates are relative to 1972, the year before HCI. Estimates are from a linear two-way fixed effect regression, and with industry and year effects. Specifications with controls include pre-1973 averages for wagebill, firm size, material costs, and labor productivity, interacted with time.Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

[*] Source for Panel A - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1970-1986.

[†] Source for Panel B - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1967-1986.

Table B2: Differences in Industrial Development Outcomes

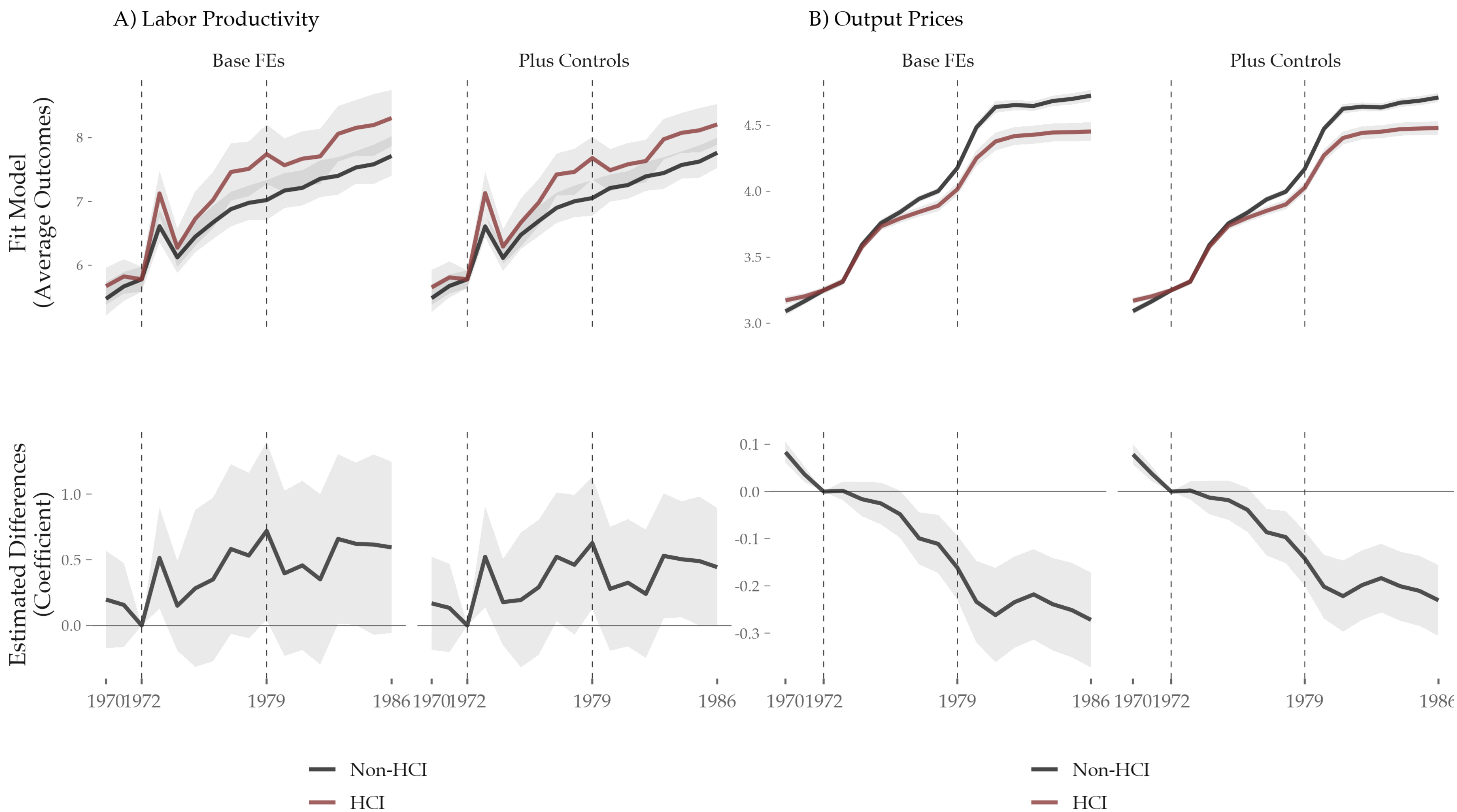
	Outcomes: Measures of industrial development (ihs)															
	Panel A) 5-Digit Panel, 1970 - 1986								Panel B) 4-Digit Panel, 1967 - 1986							
	Output Share	Prices	Labor Prod.	Avg. Size	Num. Plants	Avg. Wages	Employment	Labor Share	Output Share	Prices	Labor Prod.	Num. Plants	Avg. Size	Avg. Wages	Employment	Labor Share
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Targeted X 1967									-0.028	0.076	-0.141	0.027	-0.004	-0.372	0.044	-0.031
									(0.065)	(0.044)	(0.251)	(0.156)	(0.106)	(0.360)	(0.214)	(0.064)
Targeted X 1968									0.027	0.088*	-0.093	0.027	-0.060	-0.339	0.085	-0.016
									(0.052)	(0.039)	(0.237)	(0.143)	(0.107)	(0.344)	(0.201)	(0.059)
Targeted X 1969									0.027	0.073*	0.202	0.053	0.059	-0.351	-0.004	-0.024
									(0.047)	(0.033)	(0.296)	(0.138)	(0.097)	(0.335)	(0.196)	(0.048)
Targeted X 1970	-0.012	0.087***	0.257	0.167	0.103	0.050	0.087	0.011	-0.095	0.080***	0.256	0.127	0.170	-0.062	0.116	0.018
	(0.020)	(0.012)	(0.225)	(0.091)	(0.077)	(0.158)	(0.183)	(0.023)	(0.056)	(0.021)	(0.217)	(0.106)	(0.137)	(0.153)	(0.207)	(0.049)
Targeted X 1971	-0.012	0.037***	0.166	0.054	0.030	-0.020	0.047	-0.008	-0.024	0.051*	0.119	0.041	0.021	-0.032	0.207	0.006
	(0.016)	(0.010)	(0.189)	(0.088)	(0.068)	(0.157)	(0.177)	(0.023)	(0.033)	(0.019)	(0.175)	(0.087)	(0.084)	(0.120)	(0.223)	(0.042)
Targeted X 1972	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
Targeted X 1973	0.024	0.007	0.586**	0.062	0.087	0.301	0.394**	0.029	0.043	-0.022	0.299	0.063	0.108	0.122	0.166	0.047
	(0.015)	(0.011)	(0.204)	(0.090)	(0.056)	(0.158)	(0.138)	(0.015)	(0.029)	(0.018)	(0.188)	(0.079)	(0.106)	(0.153)	(0.172)	(0.026)
Targeted X 1974	0.045*	0.003	0.286	0.032	0.245***	0.195	0.403**	0.055**	0.091*	-0.020	-0.034	0.083	-0.028	-0.115	0.004	0.068*
	(0.019)	(0.020)	(0.185)	(0.083)	(0.064)	(0.152)	(0.133)	(0.018)	(0.042)	(0.028)	(0.158)	(0.056)	(0.076)	(0.186)	(0.085)	(0.033)
Targeted X 1975	0.039	-0.007	0.213	0.087	0.263*	0.139	0.343	0.057	0.013	-0.011	0.134	0.241	0.191	0.075	0.169	0.036
	(0.024)	(0.022)	(0.234)	(0.096)	(0.107)	(0.195)	(0.199)	(0.031)	(0.057)	(0.034)	(0.176)	(0.167)	(0.135)	(0.167)	(0.226)	(0.049)
Targeted X 1976	0.072*	-0.034	0.226	0.007	0.198	0.101	0.292	0.075*	0.074	-0.045	0.501	0.255	0.179	0.421	0.326	0.070
	(0.028)	(0.025)	(0.233)	(0.089)	(0.126)	(0.188)	(0.218)	(0.033)	(0.069)	(0.037)	(0.288)	(0.203)	(0.135)	(0.264)	(0.299)	(0.059)
Targeted X 1977	0.090**	-0.090**	0.468*	0.068	0.245	0.338	0.470*	0.088**	0.110	-0.096*	0.565*	0.306	0.138	0.488	0.428	0.085
	(0.032)	(0.027)	(0.225)	(0.101)	(0.125)	(0.179)	(0.202)	(0.034)	(0.074)	(0.041)	(0.258)	(0.212)	(0.138)	(0.259)	(0.288)	(0.060)
Targeted X 1978	0.127***	-0.094**	0.519*	0.003	0.242	0.379*	0.502*	0.113**	0.163*	-0.109*	0.612*	0.320	0.107	0.561*	0.471	0.138*
	(0.035)	(0.028)	(0.220)	(0.088)	(0.131)	(0.171)	(0.196)	(0.037)	(0.076)	(0.048)	(0.267)	(0.226)	(0.126)	(0.273)	(0.312)	(0.069)
Targeted X 1979	0.147***	-0.138***	0.636**	-0.028	0.349**	0.432*	0.680**	0.125**	0.200*	-0.158**	0.677*	0.401	0.118	0.615*	0.513	0.156*
	(0.036)	(0.031)	(0.238)	(0.093)	(0.132)	(0.195)	(0.210)	(0.038)	(0.077)	(0.055)	(0.267)	(0.223)	(0.136)	(0.278)	(0.308)	(0.074)
Targeted X 1980	0.139***	-0.203***	0.474*	-0.003	0.363**	0.330	0.536**	0.120**	0.201*	-0.216**	0.714**	0.385	0.148	0.695*	0.477	0.152*
	(0.036)	(0.036)	(0.205)	(0.096)	(0.137)	(0.174)	(0.206)	(0.038)	(0.078)	(0.066)	(0.245)	(0.223)	(0.139)	(0.276)	(0.294)	(0.068)
Targeted X 1981	0.165***	-0.227***	0.542*	-0.006	0.398**	0.375*	0.557**	0.121**	0.258**	-0.238**	0.716*	0.406	0.131	0.756*	0.493	0.156*
	(0.040)	(0.040)	(0.209)	(0.094)	(0.139)	(0.170)	(0.204)	(0.038)	(0.091)	(0.071)	(0.281)	(0.226)	(0.124)	(0.293)	(0.308)	(0.073)
Targeted X 1982	0.171***	-0.194***	0.485*	0.039	0.407**	0.326	0.541*	0.124**	0.275**	-0.223**	0.787**	0.441	0.123	0.700*	0.535	0.160*
	(0.043)	(0.037)	(0.217)	(0.092)	(0.146)	(0.175)	(0.220)	(0.039)	(0.098)	(0.069)	(0.276)	(0.242)	(0.122)	(0.290)	(0.338)	(0.077)
Targeted X 1983	0.182***	-0.180***	0.581*	0.089	0.443**	0.375*	0.510*	0.135***	0.287**	-0.221**	0.728**	0.393	0.036	0.590*	0.476	0.195*
	(0.046)	(0.037)	(0.236)	(0.085)	(0.166)	(0.189)	(0.250)	(0.040)	(0.099)	(0.070)	(0.226)	(0.255)	(0.100)	(0.233)	(0.350)	(0.077)
Targeted X 1984	0.193***	-0.203***	0.486*	0.003	0.428*	0.298	0.500*	0.146***	0.304**	-0.245***	0.764**	0.414	0.001	0.647**	0.550	0.221**
	(0.047)	(0.038)	(0.217)	(0.083)	(0.171)	(0.181)	(0.242)	(0.042)	(0.102)	(0.070)	(0.226)	(0.267)	(0.105)	(0.237)	(0.356)	(0.080)
Targeted X 1985	0.205***	-0.216***	0.534*	-0.014	0.420*	0.331	0.575*	0.157***	0.323**	-0.253***	0.674**	0.449	0.057	0.620*	0.528	0.238**
	(0.050)	(0.039)	(0.264)	(0.089)	(0.183)	(0.215)	(0.275)	(0.042)	(0.104)	(0.071)	(0.228)	(0.273)	(0.097)	(0.236)	(0.364)	(0.080)
Targeted X 1986	0.212***	-0.238***	0.628**	0.022	0.501**	0.415*	0.676*	0.168***	0.343**	-0.279***	0.648**	0.511	0.073	0.658**	0.572	0.255**
	(0.051)	(0.039)	(0.236)	(0.085)	(0.182)	(0.199)	(0.264)	(0.044)	(0.109)	(0.070)	(0.224)	(0.280)	(0.102)	(0.229)	(0.379)	(0.082)
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.900	0.971	0.583	0.761	0.866	0.595	0.789	0.899	0.904	0.972	0.743	0.867	0.824	0.745	0.807	0.925
Observations	4063	4059	4063	4063	4063	4063	4063	4063	1720	1711	1720	1720	1720	1720	1720	1720
Clusters	239	239	239	239	239	239	239	239	86	86	86	86	86	86	86	86
Joint Test of Pre-Trend (F-Test)	0.313	28.302	0.672	1.717	0.998	0.170	0.120	0.655	1.000	4.164	1.180	0.736	1.766	0.292	0.771	0.400
Joint Test of Pre-Trend (P-Values)	0.732	0.000	0.512	0.182	0.370	0.843	0.887	0.520	0.423	0.002	0.326	0.599	0.129	0.916	0.574	0.848

Note:
Table shows dynamic differences-in-differences estimates for the relationship between Heavy and Chemical Industry Drive (HCI) industrial policy and industrial outcomes. Output share is the industry share of manufacturing output. Prices are output prices. Labor Productivity is value added per worker. Average Size is the average establishment size. Number of Plants is the count of establishments. Employment is total number of industry workers. Labor Share is the industry's share of manufacturing employment. Variables are ihs normalized.. Targeted x Year correspond to the interaction between treatment indicator (0 or 1 for HCI industry) and year effects; coefficient estimates are relative to 1972, the year before HCI. Estimates are from a linear two-way fixed effect regression, and with industry and year effects. Specifications with controls include pre-1973 averages for wagebill, firm size, material costs, and labor productivity, interacted with time.Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

[*] Source for Panel A - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1970-1986.

[†] Source for Panel B - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1967-1986.

Figure B1: Differences in Value Added Per Worker and Output Prices, Relative to 1972



Note: Figure shows dynamic differences-in-differences estimates for the relationship between HCI and labor productivity, or value added per worker, in Panel A and output prices in Panel B. Top row shows the averages for HCI (red) and non-HCI industry (black). Bottom row plots dynamic differences-in-differences estimates from the regression. Estimates are relative to 1972, the year before the HCI policy. The line at 1979 demarcates the fall of the Park regime. Standard errors are clustered at the industry-level and corrected for heteroskedasticity. Confidence bands are in light grey and are 95 percent confidence interveals. Regression tables are in Appendix.

Table B3: Differences in the Evolution of Comparative Advantage

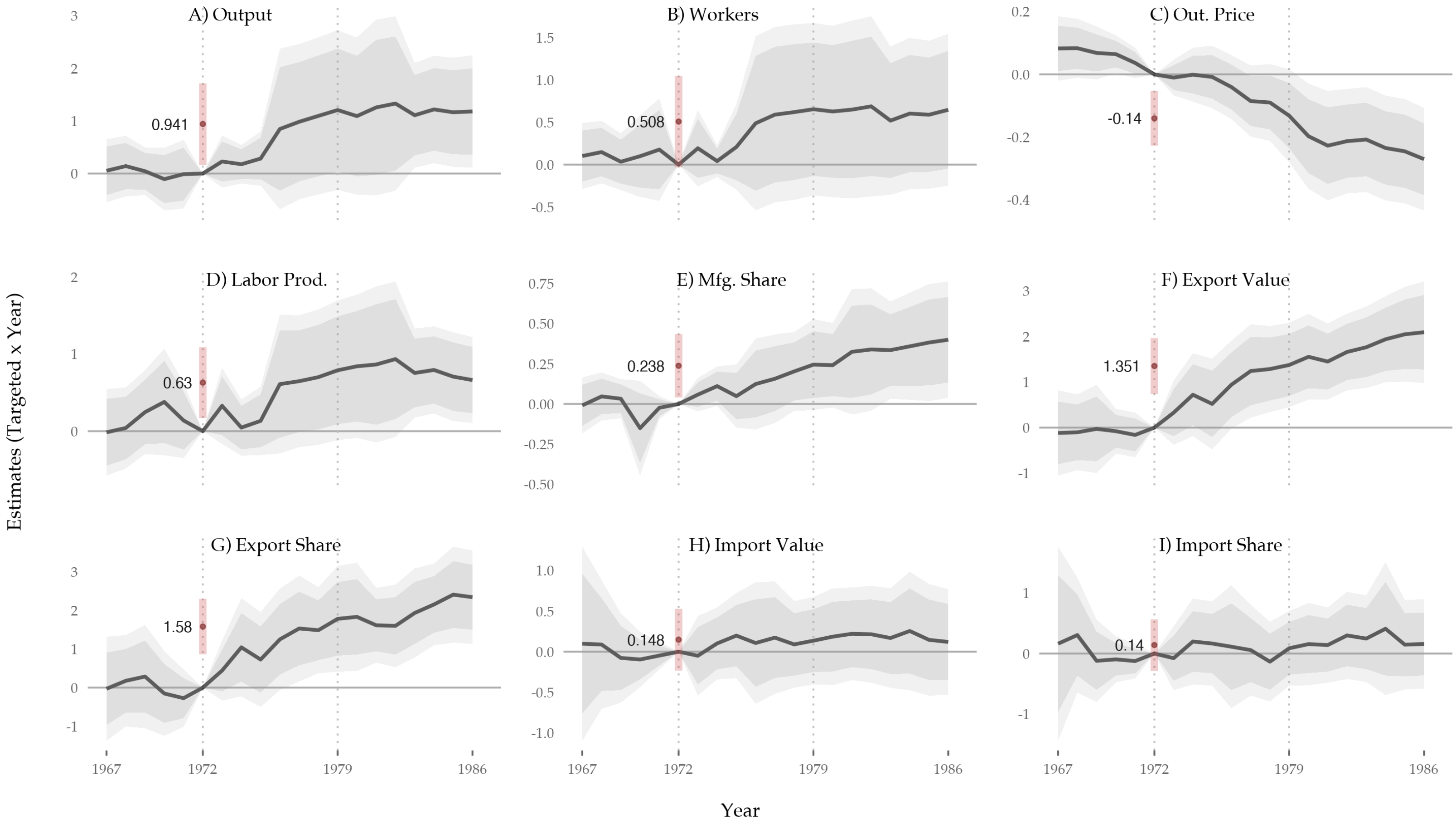
	Outcomes - Revealed comparative advantage							
	RCA (ihs)		RCA (ln)		RCA		I[RCA>1] (dummy)	
	1	2	3	4	5	6	7	8
Targeted X 1965	-1.182***	-1.149***	-0.085	-0.103	-0.243	-0.426	-0.041	-0.044
	(0.319)	(0.324)	(0.059)	(0.061)	(0.227)	(0.266)	(0.043)	(0.044)
Targeted X 1966	-0.682*	-0.652*	-0.061	-0.067	-0.319	-0.447	-0.024	-0.023
	(0.315)	(0.310)	(0.059)	(0.060)	(0.300)	(0.362)	(0.044)	(0.045)
Targeted X 1967	-0.610*	-0.531	-0.063	-0.062	-0.314	-0.420	-0.048	-0.051
	(0.310)	(0.307)	(0.060)	(0.060)	(0.282)	(0.339)	(0.042)	(0.043)
Targeted X 1968	-0.672*	-0.647*	-0.013	-0.004	-0.105	-0.084	0.002	0.008
	(0.312)	(0.313)	(0.064)	(0.066)	(0.185)	(0.207)	(0.042)	(0.043)
Targeted X 1969	-0.830**	-0.865**	-0.059	-0.057	-0.208	-0.254	-0.019	-0.015
	(0.270)	(0.276)	(0.049)	(0.050)	(0.190)	(0.223)	(0.039)	(0.039)
Targeted X 1970	-0.600*	-0.647**	-0.036	-0.034	-0.218	-0.250	0.003	0.003
	(0.241)	(0.247)	(0.046)	(0.047)	(0.187)	(0.214)	(0.037)	(0.039)
Targeted X 1971	-0.098	-0.129	-0.032	-0.040	-0.406*	-0.480	-0.033	-0.037
	(0.215)	(0.212)	(0.037)	(0.038)	(0.207)	(0.253)	(0.032)	(0.033)
Targeted X 1972	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
Targeted X 1973	0.221	0.189	0.039	0.038	0.204	0.152	0.015	0.012
	(0.191)	(0.195)	(0.041)	(0.041)	(0.218)	(0.273)	(0.033)	(0.032)
Targeted X 1974	0.481*	0.510*	0.172*	0.166*	0.403	0.269	0.123*	0.111*
	(0.237)	(0.240)	(0.074)	(0.076)	(0.299)	(0.339)	(0.049)	(0.049)
Targeted X 1975	0.369	0.446	0.120	0.132	0.304	0.195	0.069	0.074
	(0.236)	(0.237)	(0.071)	(0.073)	(0.397)	(0.480)	(0.043)	(0.044)
Targeted X 1976	0.381	0.403	0.100	0.094	0.358	0.216	0.036	0.028
	(0.244)	(0.245)	(0.059)	(0.061)	(0.347)	(0.403)	(0.038)	(0.038)
Targeted X 1977	0.616*	0.688*	0.179*	0.192*	0.639	0.571	0.082	0.088
	(0.277)	(0.276)	(0.077)	(0.076)	(0.348)	(0.382)	(0.049)	(0.049)
Targeted X 1978	0.618*	0.665**	0.171*	0.186*	0.808*	0.759	0.069	0.086
	(0.248)	(0.248)	(0.074)	(0.074)	(0.380)	(0.419)	(0.047)	(0.048)
Targeted X 1979	0.711*	0.767**	0.201*	0.208**	0.859*	0.818	0.107*	0.111*
	(0.278)	(0.272)	(0.078)	(0.077)	(0.413)	(0.455)	(0.049)	(0.050)
Targeted X 1980	0.745**	0.716**	0.212*	0.197*	0.963*	0.877	0.132*	0.123*
	(0.274)	(0.274)	(0.084)	(0.083)	(0.463)	(0.501)	(0.052)	(0.052)
Targeted X 1981	0.723*	0.691*	0.238**	0.223**	1.370*	1.250	0.124*	0.115*
	(0.280)	(0.276)	(0.088)	(0.086)	(0.578)	(0.642)	(0.052)	(0.052)
Targeted X 1982	0.810**	0.737*	0.316***	0.297**	1.666**	1.517*	0.149**	0.140*
	(0.297)	(0.294)	(0.094)	(0.092)	(0.587)	(0.632)	(0.054)	(0.055)
Targeted X 1983	0.820**	0.773**	0.370***	0.347***	1.864**	1.694*	0.198***	0.198***
	(0.286)	(0.285)	(0.097)	(0.095)	(0.604)	(0.655)	(0.057)	(0.057)
Targeted X 1984	0.872**	0.813**	0.368***	0.343***	1.915**	1.737*	0.198***	0.192**
	(0.288)	(0.286)	(0.095)	(0.094)	(0.662)	(0.723)	(0.057)	(0.058)
Targeted X 1985	0.949**	0.924**	0.376***	0.356***	1.928**	1.761*	0.198***	0.189***
	(0.288)	(0.281)	(0.091)	(0.088)	(0.659)	(0.718)	(0.054)	(0.055)
Targeted X 1986	1.090***	1.072***	0.391***	0.375***	1.695**	1.547*	0.215***	0.216***
	(0.278)	(0.273)	(0.088)	(0.086)	(0.560)	(0.629)	(0.055)	(0.055)
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Baseline Controls	No	Yes	No	Yes	No	Yes	No	Yes
R-Squared	0.703	0.717	0.702	0.723	0.613	0.647	0.561	0.573
Observations	10758	10670	10758	10670	10758	10670	10758	10670
Clusters	489	485	489	485	489	485	489	485
Joint Test of Pre-Trend (F-Test)	2.771	2.705	0.929	1.225	0.911	1.441	0.681	0.804
Joint Test of Pre-Trend (P-Values)	0.008	0.009	0.483	0.287	0.497	0.187	0.689	0.584

Note:

Table shows dynamic differences-in-differences estimates for the relationship between Heavy and Chemical Industry Drive (HCI) industrial policy and trade development outcomes. RCA (ihs) and RCA (ln) are normalized revealed comparative advantage; RCA is raw index. 'Dummy' is an indicator equal to one if an industry has realized RCA (RCA>1). Panel is at the SITC Rev. 1, 4-digit level. Trade values reflect real values (won, 2010 base).. Targeted x Year correspond to the interaction between treatment indicator (0 or 1 for HCI industry) and year effects; coefficient estimates are relative to 1972, the year before HCI. Estimates are from a linear two-way fixed effect regression, and with industry and year effects. Specifications with controls include pre-1973 averages for wagebill, firm size, material costs, and labor productivity, interacted with time.Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

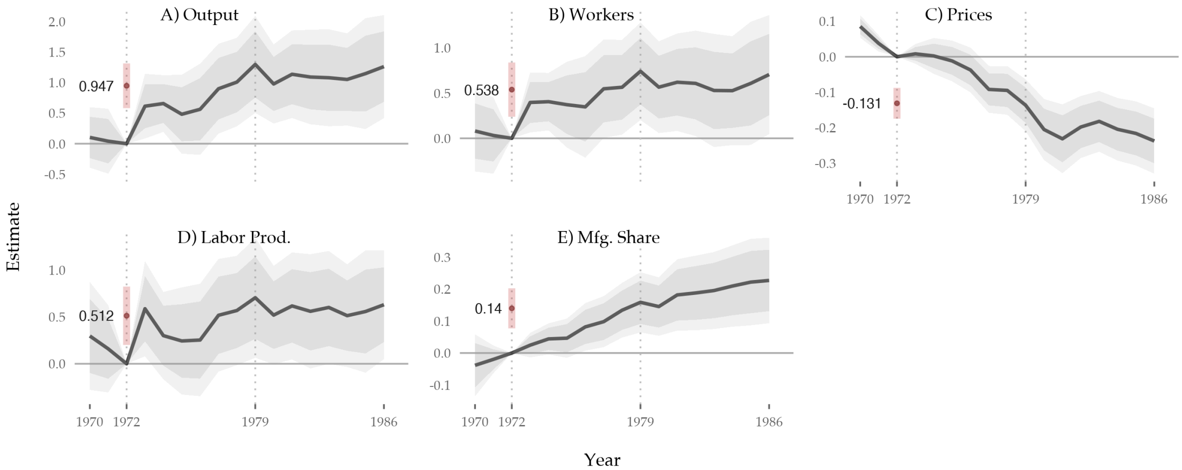
* UN COMTRADE database. Mining and Manufacturing Survey and Mining and Manufacturing Census: 1967-1986.

Figure B2: Semiparametric Doubly-Robust Estimates Across Industrial Development Outcomes, 4 Digit Industry Panel



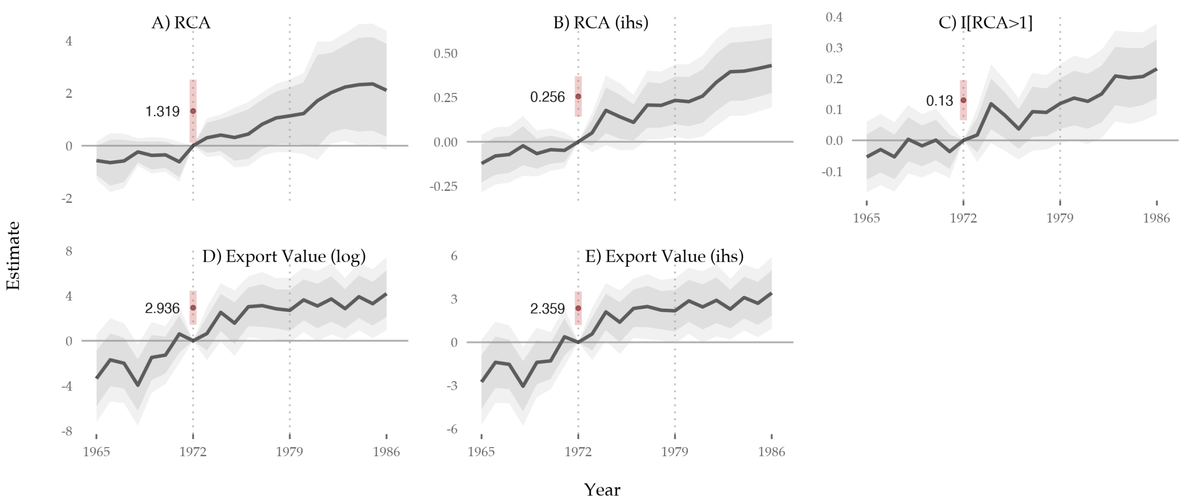
Notes: This figure plots semiparametric (doubly-robust) differences-in-differences estimates for the impact of HCI on core industrial development outcomes. They include (ihs) value of shipments; employment; output prices; labor productivity (value added per worker); mfg. share (manufacturing share of output shipped); export values and mfg. share of exports (manufacturing share of exports); and import values and mfg. share of imports (manufacturing share of exports). All values are real (2010). This figure reports estimates for longer 4-digit industrial series (1967-1986). Average treatment effect on treated (ATT) shown by the bold red dot. The light red error bar is the 95 percent confidence interval. Semiparametric estimates for each year are plotted by the dark lines. All point estimates are relative to the 1972 baseline level (coefficients normalized to 0). The 95 confidence bands are in light gray; 90 percent, are in dark gray. Standard errors are from a bootstrap procedure (10,000 iterations) and allow for within industry correlation. Specifications are made to be as close as possible to two-way fixed effects estimates. Controls are the same baseline covaraiates used across in linear specifications: (pre-1973) average wagebill, average firm size, total costs, and labor productivity.

Figure B3: Semiparametric Doubly-Robust Estimates Across Industrial Development Outcomes, 5 Digit Industry Panel



Notes: This figure plots semiparametric (doubly-robust) differences-in-differences estimates for the impact of HCI on core industrial development outcomes. They include (ihs) value of shipments; employment; output prices; labor productivity (value added per worker); mfg. share (manufacturing share of output shipped). All values are real (2010). This figure reports estimates for longer 5-digit industrial series (1970-1986). Average treatment effect on treated (ATT) shown by the bold red dot. The light red error bar is the 95 percent confidence interval. Semiparametric estimates for each year are plotted by the dark lines. All point estimates are relative to the 1972 baseline level (coefficients normalized to 0). The 95 confidence bands are in light gray; 90 percent, are in dark gray. Standard errors are from a bootstrap procedure (10,000 iterations) and allow for within industry correlation. Specifications are made to be as close as possible to two-way fixed effects estimates. Controls are the same baseline covaraiates used across in linear specifications: (pre-1973) average wagebill, average firm size, total costs, and labor productivity.

Figure B4: Semiparametric Doubly-Robust Estimates Across Industrial Development Outcomes, Trade Data Panel



Notes: This figure plots semiparametric (doubly-robust) differences-in-differences estimates for the impact of HCI on trade development and comparative advantage outcomes. All values are real (2010). This figure reports estimates for longer 4-digit SITC series (1965-1986). Average treatment effect on treated (ATT) shown by the bold red dot. The light red error bar is the 95 percent confidence interval. Semiparametric estimates for each year are plotted by the dark lines. All point estimates are relative to the 1972 baseline level (coefficients normalized to 0). The 95 confidence bands are in light gray; 90 percent, are in dark gray. Standard errors are from a bootstrap procedure (10,000 iterations) and allow for within industry correlation. Specifications are made to be as close as possible to two-way fixed effects estimates. Controls are the same baseline covaraiates used across in linear specifications: (pre-1973) average wagebill, average firm size, total costs, and labor productivity.

Table C1: Impact of HCI on Input Use and Investment, HCI vs. Non-HCI Industry

	Panel A) 5-Digit Panel, 1970 - 1986						Panel B) 4-Digit Panel, 1967 - 1986					
	Material Costs		Capital Formation		Inventory Investment		Material Costs		Capital Formation		Inventory Investment	
	ihs	levels	ihs	levels	ihs	levels	ihs	levels	ihs	levels	ihs	levels
	1	2	3	4	5	6	1	2	3	4	5	6
Targeted X 1967							0.114	2670.793	0.028	-7948.374*	0.971	-772.964
							(0.243)	(18136.663)	(0.320)	(3618.044)	(0.847)	(1521.902)
Targeted X 1968							0.193	7182.233	0.090	-8480.625*	0.219	884.032
							(0.222)	(17534.330)	(0.319)	(3927.243)	(1.055)	(1723.160)
Targeted X 1969							0.146	14223.480	0.009	-7611.858	-0.716	98.866
							(0.225)	(18742.024)	(0.274)	(3999.817)	(0.964)	(1129.185)
Targeted X 1970	0.212	3060.532	-0.390	-2136.138*	0.024	-515.440	0.109	9316.475	-0.520	-7151.245*	-0.169	2114.482
	(0.221)	(4209.806)	(0.271)	(981.253)	(0.264)	(1195.656)	(0.313)	(15828.646)	(0.267)	(3493.715)	(0.255)	(2032.223)
Targeted X 1971	0.106	1156.358	0.148	-1300.148	-0.083	-571.502	0.239	4924.348	0.082	-6484.134*	0.044	3010.923
	(0.233)	(4300.608)	(0.279)	(701.585)	(0.239)	(1186.912)	(0.309)	(12362.932)	(0.362)	(3004.511)	(0.300)	(2461.391)
Targeted X 1972	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
Targeted X 1973	0.641**	-2013.964	0.455	-616.195	1.426***	1290.239	0.208	17601.905	-0.130	-1448.558	0.317	13023.835
	(0.211)	(8048.115)	(0.237)	(1326.956)	(0.417)	(1561.157)	(0.249)	(27319.841)	(0.199)	(2910.677)	(0.246)	(8389.741)
Targeted X 1974	0.566**	33425.275*	0.427	777.710	0.646**	3039.417	0.112	119940.435*	0.079	-3154.041	0.380	19144.270
	(0.183)	(13140.184)	(0.240)	(1910.172)	(0.238)	(3309.007)	(0.135)	(50661.977)	(0.236)	(5326.923)	(0.302)	(13568.681)
Targeted X 1975	0.427	30397.193*	0.260	1307.606	0.366	-584.700	0.327	94629.095	-0.042	2182.543	0.074	-729.773
	(0.255)	(14934.173)	(0.273)	(2085.499)	(0.276)	(2457.259)	(0.268)	(62447.037)	(0.312)	(7298.379)	(0.349)	(7353.068)
Targeted X 1976	0.487	64222.799*	0.075	1061.996	0.364	313.402	0.611	169077.675	-0.064	3807.311	0.313	1227.783
	(0.297)	(28010.532)	(0.285)	(1807.537)	(0.288)	(2470.217)	(0.449)	(98852.651)	(0.296)	(4028.178)	(0.336)	(8851.431)
Targeted X 1977	0.751**	67989.230**	0.454	2925.354	0.722**	2295.473	0.729	221003.059*	-0.075	3883.313	0.434	9070.462
	(0.273)	(25853.254)	(0.292)	(2157.916)	(0.254)	(2217.594)	(0.407)	(108573.924)	(0.261)	(4175.132)	(0.278)	(8485.915)
Targeted X 1978	0.893***	136834.169***	0.649*	10060.489**	0.754	7465.061	0.896*	415637.433**	0.287	17543.181*	1.334	14756.709
	(0.267)	(38851.138)	(0.303)	(3822.153)	(0.565)	(4325.488)	(0.420)	(149523.453)	(0.308)	(7536.365)	(1.246)	(8895.524)
Targeted X 1979	1.085***	155959.595***	0.732*	9673.047	1.035*	8824.968	0.899*	490591.786**	0.150	37053.047	-0.684	28640.932
	(0.289)	(44687.921)	(0.296)	(5056.196)	(0.496)	(4641.718)	(0.428)	(174708.812)	(0.330)	(27108.602)	(1.063)	(18428.570)
Targeted X 1980	0.765**	146078.260**	0.798**	16658.507**	0.701	7211.787	0.724	514659.757**	0.274	36864.066	1.098	36733.947
	(0.249)	(45343.587)	(0.270)	(6014.037)	(0.742)	(4823.090)	(0.398)	(192610.694)	(0.280)	(18810.047)	(0.589)	(23280.719)
Targeted X 1981	0.798**	171670.189***	0.458	16656.200**	1.044	6454.589	0.801	660494.347**	0.232	42943.073*	1.517	25575.583
	(0.256)	(49548.800)	(0.293)	(6402.512)	(0.773)	(5638.788)	(0.430)	(227301.922)	(0.253)	(19345.070)	(1.185)	(25132.513)
Targeted X 1982	0.791**	199705.840***	0.558	18157.476**	1.221	-1240.609	0.870	708792.033**	0.368	60031.408	-0.210	648.359
	(0.278)	(54470.951)	(0.316)	(6799.063)	(0.990)	(2019.608)	(0.440)	(235361.889)	(0.275)	(33607.838)	(1.816)	(8450.278)
Targeted X 1983	0.870**	253047.054***	0.710*	14420.245**			0.843	891837.642**	0.630	24244.829*		
	(0.301)	(68183.330)	(0.316)	(5330.113)			(0.427)	(284769.230)	(0.356)	(10523.862)		
Targeted X 1984	0.798**	311497.774***	0.767*	22135.006**			0.905*	1083323.583**	0.632	39424.549		
	(0.293)	(88474.028)	(0.295)	(8354.287)			(0.437)	(358180.091)	(0.365)	(22251.208)		
Targeted X 1985	0.859*	339798.813***	0.784*	20483.801**			0.858	1191670.380**	0.581	37754.227*		
	(0.347)	(91676.273)	(0.333)	(7018.181)			(0.449)	(371811.393)	(0.382)	(18929.359)		
Targeted X 1986	0.971**	441636.267***	0.924**	50542.976**			0.864	1414448.727**	0.737	87965.454*		
	(0.324)	(120307.655)	(0.333)	(16178.994)			(0.461)	(473524.134)	(0.402)	(37292.324)		
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	X	X	X	X	X	X	X	X	X	X	X	X
Controls	X	X	X	X	X	X	X	X	X	X	X	X
R-Squared	0.763	0.836	0.770	0.615	0.407	0.722	0.813	0.858	0.850	0.599	0.428	0.718
Observations	4063	4063	4034	4034	3107	3107	1720	1720	1716	1716	1376	1376
Clusters	239	239	238	238	239	239	86	86	86	86	86	86
Joint Test of Pre-Trend (F-Test)	0.486	0.363	1.984	2.377	0.102	0.116	0.525	0.395	1.265	1.466	0.715	0.944
Joint Test of Pre-Trend (P-Values)	0.616	0.696	0.140	0.095	0.903	0.890	0.757	0.851	0.287	0.209	0.614	0.457

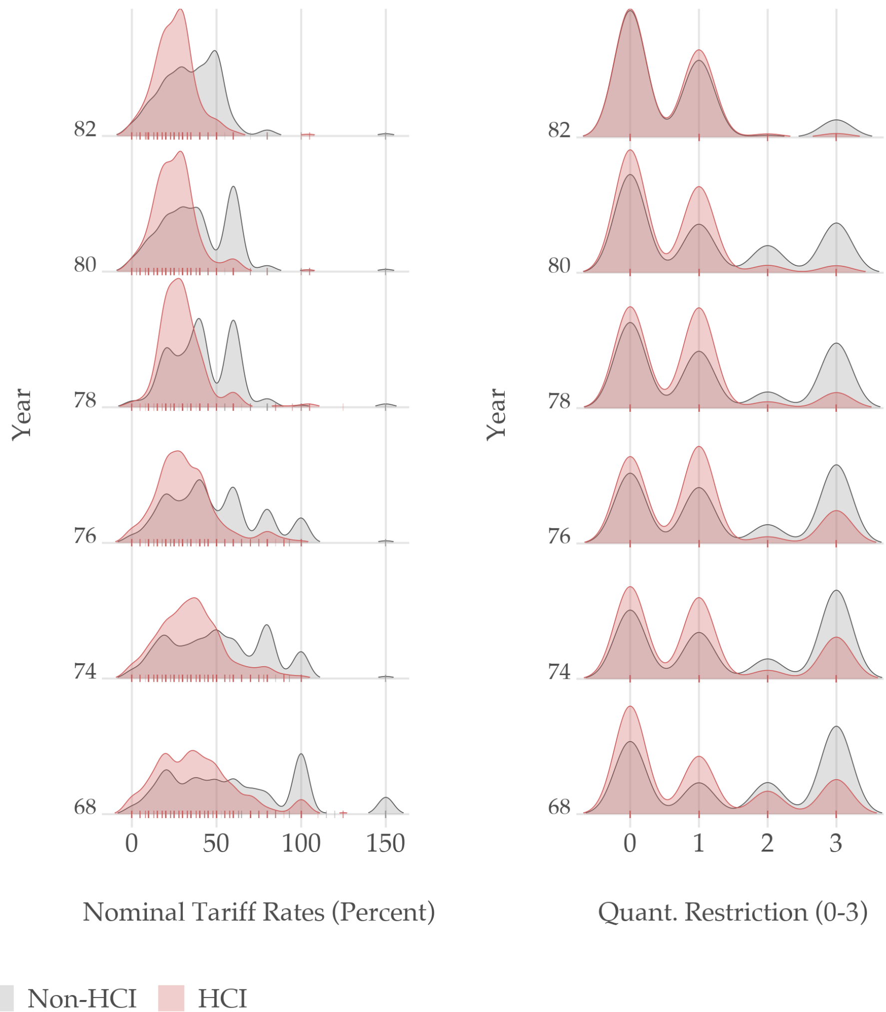
Note:

Table shows dynamic differences-in-differences estimates for the relationship between Heavy and Chemical Industry Drive (HCI) industrial policy and outcomes related to input use, capital investment, and inventory investment. Material Costs are real total input material costs. Total Investment is real total gross fixed capital investment. Inventory Investment is annual real change in total inventories. Both levels and ihs-normalized outcomes are reported, to accommodate 0s in investment and negative changes in inventories. Targeted x Year correspond to the interaction between treatment indicator (0 or 1 for HCI industry) and year effects; coefficient estimates are relative to 1972, the year before HCI. Estimates are from a linear two-way fixed effect regression, and with industry level and year effects. Specifications with controls include pre-1973 averages for wagebill, firm size, material costs, and labor productivity, interacted with time. Panel A shows estimates using shorter, detailed 5-digit level industrial data (1970-1986). Panel B shows estimates using longer, aggregate 4-digit level industrial data (1967-1986). Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

[*] Source for Panel A - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1970-1986.

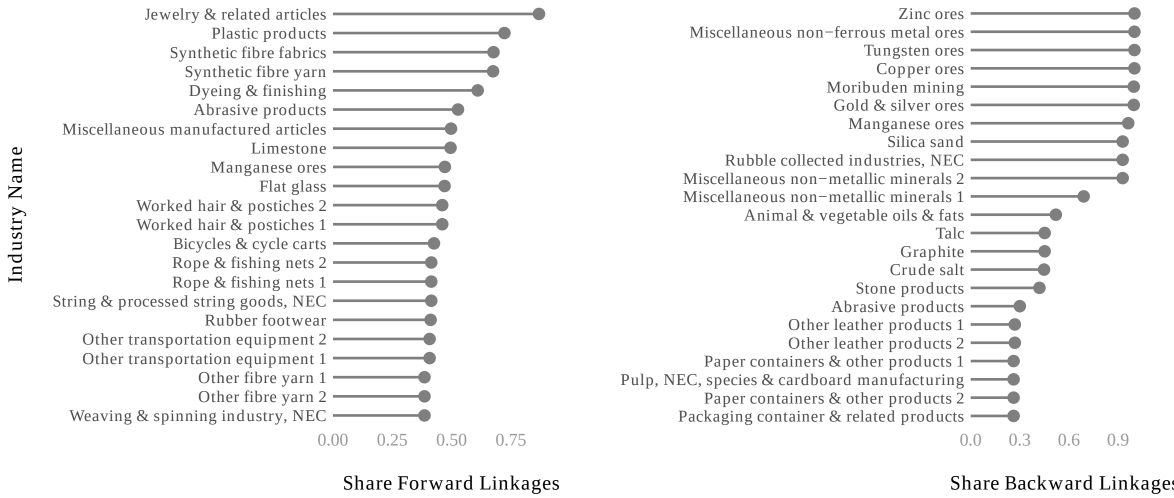
[†] Source for Panel B - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1967-1986.

Figure C1: Changes in Distribution of Trade Policies, HCI vs. Non-HCI, 1968-1982



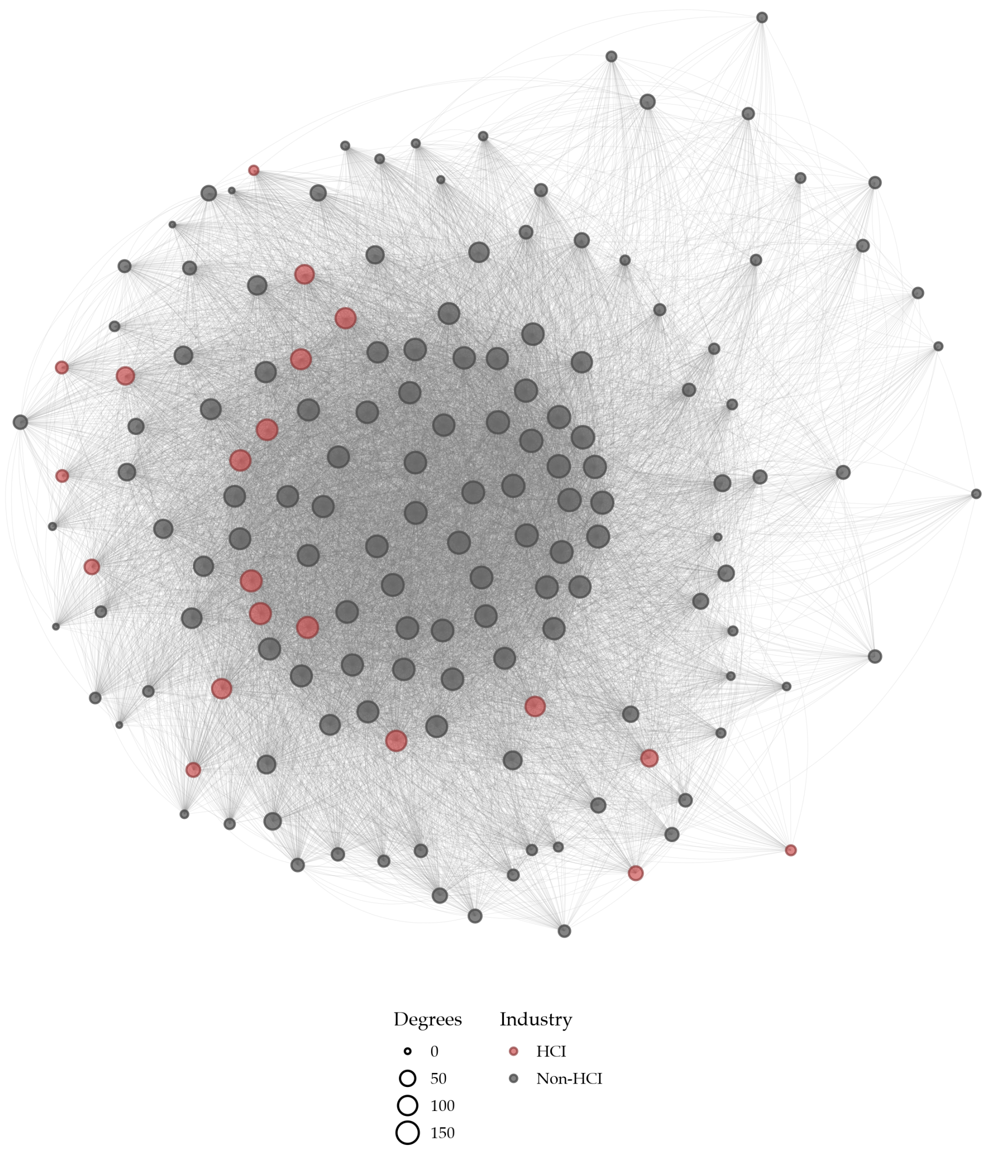
Notes: Figure shows the decline and convergence in (A) nominal tariff rates (percent) and (B) quantitative restrictions (severity scores 0-3). The kernal dentsity distribution for HCI products is in red; non-HCI products are in gray. Distributions are estimated over annual product-level data (unweighted, CCCN code level) for years 1968, 1974, 1978, 1980, and 1982. Data from Luedde-Neurath (1986), who coded the severity of quantitative restriction within 4-digit products using a 0-3 scale, from no restrictions (0) to severe (3). Kernel density bandwidths are 4.6 percent and 0.229 for tariffs and QR, respectively.

Figure D1: Top 20 Non-HCI Sectors with Highest Forward and Backward (Direct) Linkages to Targeted Industry



Notes: Figure shows the top−ranked manufacturing industries in terms of backward linkages and forward linkages to targeted industries. Both forward and backward linkages are oriented in terms of the treated sector. Share Backward Linkage measures the weighted share of output from a non−HCI industry being sold to an HCI industry. Whereas, Share Forward Linkage measures the weighted share inputs a non−HCI industry sources from HCI industry. See text for definitions of weights. Both measures are direct I−0 flows, and are calculated from the 1970 Bank of Korea input−output tables.

Figure D2: Targeted Sectors and Non-Targeted Sectors in the 1970 Korean Industrial Network, Weighted by Number of Outward Connections (Forward Linkages) to Downstream Sectors



Notes: Figure above shows network diagram of HCI (red) and non-HCI sectors (gray). Nodes are industries, and gray network links (or 'edges') indicate a linkages between sector that sell output to downstream buyers. These are also called 'forward links.' The size each nodes reflects the raw number of outward links. Source: 1970 'medium' input-output tables, Bank of Korea.

Table E1: Impact of Direct Forward Linkages on Downstream Output

	Outcome - Real value added (ihs)							
	Panel A) 5-Digit Panel, 1970 - 1986				Panel B) 4-Digit Panel, 1967 - 1986			
	Full Sample		Non-HCI Sample		Full Sample		Non-HCI Sample	
	1	2	3	4	1	2	3	4
1967 X Forward Link					0.00250	0.000382	0.00257	0.000777
					(0.00711)	(0.00663)	(0.0109)	(0.0114)
1968 X Forward Link					0.00870	0.00585	0.0118	0.00958
					(0.00647)	(0.00612)	(0.0102)	(0.0107)
1969 X Forward Link					0.0122	0.00909	0.0200	0.0177
					(0.00992)	(0.00924)	(0.0157)	(0.0157)
1970 X Forward Link	-0.00664	-0.00596	-0.0104	-0.0100	-0.00174	-0.00216	-0.00188	-0.00230
	(0.00694)	(0.00710)	(0.00892)	(0.00892)	(0.00435)	(0.00456)	(0.00535)	(0.00545)
1971 X Forward Link	-0.00656	-0.00871*	-0.00439	-0.00699	-0.00191	-0.00194	-0.00300	-0.00304
	(0.00451)	(0.00431)	(0.00582)	(0.00547)	(0.00291)	(0.00286)	(0.00363)	(0.00336)
1972 X Forward Link	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
1973 X Forward Link	-0.00479	-0.00305	-0.00477	-0.00251	-0.00443	-0.00280	-0.00769	-0.00652
	(0.00574)	(0.00592)	(0.00756)	(0.00763)	(0.00322)	(0.00284)	(0.00543)	(0.00492)
1974 X Forward Link	0.0000774	0.00263	0.00305	0.00618	0.00486	0.00617	0.00308	0.00370
	(0.00444)	(0.00450)	(0.00568)	(0.00559)	(0.00389)	(0.00325)	(0.00620)	(0.00546)
1975 X Forward Link	0.0146	0.0172	0.0113	0.0135	0.00885	0.0125*	0.00977	0.0121
	(0.00825)	(0.00909)	(0.0107)	(0.0116)	(0.00642)	(0.00621)	(0.0101)	(0.00841)
1976 X Forward Link	0.0265**	0.0257**	0.0290*	0.0270*	0.0162	0.0174*	0.0166	0.0173
	(0.00908)	(0.00958)	(0.0121)	(0.0123)	(0.00940)	(0.00826)	(0.0141)	(0.0130)
1977 X Forward Link	0.0323***	0.0343***	0.0335*	0.0346*	0.0225*	0.0238*	0.0250	0.0253
	(0.00958)	(0.0101)	(0.0130)	(0.0135)	(0.0103)	(0.00931)	(0.0159)	(0.0149)
1978 X Forward Link	0.0237*	0.0248*	0.0198	0.0201	0.0229*	0.0244*	0.0252	0.0257
	(0.00939)	(0.0102)	(0.0122)	(0.0130)	(0.0103)	(0.00937)	(0.0155)	(0.0145)
1979 X Forward Link	0.0278**	0.0289**	0.0222	0.0219	0.0262*	0.0274**	0.0280	0.0283
	(0.00986)	(0.0106)	(0.0120)	(0.0127)	(0.0101)	(0.00920)	(0.0153)	(0.0143)
1980 X Forward Link	0.0281**	0.0291**	0.0257*	0.0253	0.0246*	0.0266*	0.0293	0.0302
	(0.00977)	(0.0105)	(0.0129)	(0.0134)	(0.0107)	(0.0101)	(0.0168)	(0.0161)
1981 X Forward Link	0.0265**	0.0286**	0.0211	0.0220	0.0235*	0.0250*	0.0270	0.0275
	(0.00953)	(0.0103)	(0.0124)	(0.0131)	(0.0107)	(0.00964)	(0.0160)	(0.0149)
1982 X Forward Link	0.0317**	0.0335**	0.0313*	0.0320*	0.0276*	0.0296**	0.0329	0.0336
	(0.00993)	(0.0107)	(0.0135)	(0.0141)	(0.0118)	(0.0112)	(0.0183)	(0.0175)
1983 X Forward Link	0.00703	0.00854	0.00752	0.00824	0.0141*	0.0165*	0.00771	0.00900
	(0.00875)	(0.00929)	(0.0119)	(0.0126)	(0.00682)	(0.00651)	(0.00973)	(0.00876)
1984 X Forward Link	0.00994	0.0114	0.00957	0.0104	0.0152*	0.0174**	0.00839	0.00972
	(0.00947)	(0.00998)	(0.0124)	(0.0131)	(0.00658)	(0.00642)	(0.00896)	(0.00838)
1985 X Forward Link	0.00459	0.00547	0.00585	0.00626	0.0150*	0.0163*	0.0105	0.0111
	(0.00973)	(0.0103)	(0.0125)	(0.0132)	(0.00670)	(0.00681)	(0.00824)	(0.00827)
1986 X Forward Link	0.0126	0.0134	0.0160	0.0165	0.0166*	0.0179*	0.0126	0.0133
	(0.0101)	(0.0108)	(0.0133)	(0.0140)	(0.00768)	(0.00786)	(0.00965)	(0.00971)
Industry Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Targeted X Year	Yes	Yes	No	No	Yes	Yes	No	No
Network Controls	No	Yes	No	Yes	No	Yes	No	Yes
R-Squared	0.770	0.771	0.773	0.775	0.831	0.834	0.815	0.820
Observations	4726	4726	3111	3111	1760	1760	1180	1180
Clusters	278	278	183	183	88	88	59	59
Joint Test of Pre-Trend (F-Test)	0.734	1.145	1.676	1.799	1.899	1.501	4.047	4.317
Joint Test of Pre-Trend (P-Values)	0.569	0.336	0.157	0.131	0.056	0.153	0.000	0.000

Note:

Table shows dynamic differences-in-differences estimates for the relationship between direct forward linkage exposure to Heavy and Chemical Industry Drive sectors and output, measured as real value added (ihs) . Estimates are relative to 1972, the year before HCI. All specifications include industry and year effects. Panel A shows estimates using detailed 5-digit level industrial data (1970-1986). Panel B shows estimates using longer, aggregate 4-digit level industrial data (1967-1986). 'Full sample' refers to estimates for full sample of manufacturing industries (columns 1-2); full-sample regressions include controls for HCI sectors (Targeted x Year). 'Non-HCI Sample' refers to sample excluding treated industry. Controls refer to pre-1973 averages for wagebill, firm size, total costs, and labor productivity (interacted with time effects). Network Controls refer to 1970 eigenvalue centrality and total network degrees interacted with time. All regressions include controls for direct backward interacted with time. Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

[*] Source for Panel A - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1970-1986.

[†] Source for Panel B - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1967-1986.

Table E2: Impact of Direct Forward Linkages on Downstream Output Prices

	Outcome - Output prices (ihs)							
	Panel A) 5-Digit Panel, 1970 - 1986				Panel B) 4-Digit Panel, 1967 - 1986			
	Full Sample		Non-HCI Sample		Full Sample		Non-HCI Sample	
	1	2	3	4	1	2	3	4
1970 X Forward Link	0.000508	0.000461	0.000688	0.000701	0.000508	0.000461	0.000688	0.000701
	(0.000332)	(0.000339)	(0.000476)	(0.000488)	(0.000332)	(0.000339)	(0.000476)	(0.000488)
1971 X Forward Link	0.000413	0.000388	0.000533	0.000550	0.000413	0.000388	0.000533	0.000550
	(0.000237)	(0.000234)	(0.000333)	(0.000335)	(0.000237)	(0.000234)	(0.000333)	(0.000335)
1972 X Forward Link	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
1973 X Forward Link	0.000183	0.000111	-0.000316	-0.000381	0.000183	0.000111	-0.000316	-0.000381
	(0.000302)	(0.000306)	(0.000405)	(0.000406)	(0.000302)	(0.000306)	(0.000405)	(0.000406)
1974 X Forward Link	-0.000459	-0.00111*	-0.000960	-0.00162*	-0.000459	-0.00111*	-0.000960	-0.00162*
	(0.000549)	(0.000546)	(0.000738)	(0.000733)	(0.000549)	(0.000546)	(0.000738)	(0.000733)
1975 X Forward Link	-0.00105	-0.00176**	-0.00165	-0.00250**	-0.00105	-0.00176**	-0.00165	-0.00250**
	(0.000683)	(0.000670)	(0.000908)	(0.000899)	(0.000683)	(0.000670)	(0.000908)	(0.000899)
1976 X Forward Link	-0.00189*	-0.00250***	-0.00249**	-0.00328***	-0.00189*	-0.00250***	-0.00249**	-0.00328***
	(0.000745)	(0.000727)	(0.000927)	(0.000929)	(0.000745)	(0.000727)	(0.000927)	(0.000929)
1977 X Forward Link	-0.00255**	-0.00317***	-0.00319**	-0.00401***	-0.00255**	-0.00317***	-0.00319**	-0.00401***
	(0.000783)	(0.000758)	(0.000985)	(0.000982)	(0.000783)	(0.000758)	(0.000985)	(0.000982)
1978 X Forward Link	-0.00340***	-0.00407***	-0.00378***	-0.00456***	-0.00340***	-0.00407***	-0.00378***	-0.00456***
	(0.000893)	(0.000878)	(0.000951)	(0.000952)	(0.000893)	(0.000878)	(0.000951)	(0.000952)
1979 X Forward Link	-0.00259**	-0.00337***	-0.00259**	-0.00343***	-0.00259**	-0.00337***	-0.00259**	-0.00343***
	(0.000967)	(0.000944)	(0.000941)	(0.000916)	(0.000967)	(0.000944)	(0.000941)	(0.000916)
1980 X Forward Link	-0.00260*	-0.00359**	-0.00209	-0.00308*	-0.00260*	-0.00359**	-0.00209	-0.00308*
	(0.00125)	(0.00123)	(0.00133)	(0.00128)	(0.00125)	(0.00123)	(0.00133)	(0.00128)
1981 X Forward Link	-0.00294*	-0.00390**	-0.00211	-0.00304	-0.00294*	-0.00390**	-0.00211	-0.00304
	(0.00147)	(0.00146)	(0.00161)	(0.00157)	(0.00147)	(0.00146)	(0.00161)	(0.00157)
1982 X Forward Link	-0.00341*	-0.00436**	-0.00233	-0.00324*	-0.00341*	-0.00436**	-0.00233	-0.00324*
	(0.00149)	(0.00148)	(0.00150)	(0.00142)	(0.00149)	(0.00148)	(0.00150)	(0.00142)
1983 X Forward Link	-0.00355*	-0.00449**	-0.00263	-0.00351**	-0.00355*	-0.00449**	-0.00263	-0.00351**
	(0.00147)	(0.00145)	(0.00143)	(0.00134)	(0.00147)	(0.00145)	(0.00143)	(0.00134)
1984 X Forward Link	-0.00311*	-0.00408**	-0.00227	-0.00317*	-0.00311*	-0.00408**	-0.00227	-0.00317*
	(0.00148)	(0.00146)	(0.00146)	(0.00137)	(0.00148)	(0.00146)	(0.00146)	(0.00137)
1985 X Forward Link	-0.00269	-0.00368*	-0.00158	-0.00251	-0.00269	-0.00368*	-0.00158	-0.00251
	(0.00152)	(0.00150)	(0.00152)	(0.00144)	(0.00152)	(0.00150)	(0.00152)	(0.00144)
1986 X Forward Link	-0.00260	-0.00356*	-0.00166	-0.00256	-0.00260	-0.00356*	-0.00166	-0.00256
	(0.00154)	(0.00153)	(0.00151)	(0.00144)	(0.00154)	(0.00153)	(0.00151)	(0.00144)
Industry Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Targeted X Year	Yes	Yes	No	No	Yes	Yes	No	No
Network Controls	No	Yes	No	Yes	No	Yes	No	Yes
R-Squared	0.957	0.958	0.951	0.952	0.957	0.958	0.951	0.952
Observations	4722	4722	3107	3107	4722	4722	3107	3107
Clusters	278	278	183	183	278	278	183	183
Joint Test of Pre-Trend (F-Test)	18.293	17.950	59.307	60.914	18.293	17.950	59.307	60.914
Joint Test of Pre-Trend (P-Values)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note:

Table shows dynamic differences-in-differences estimates for the relationship between direct forward linkage exposure to Heavy and Chemical Industry Drive sectors and output prices (ihs) . Estimates are relative to 1972, the year before HCI. All specifications include industry and year effects. Panel A shows estimates using detailed 5-digit level industrial data (1970-1986). Panel B shows estimates using longer, aggregate 4-digit level industrial data (1967-1986). 'Full sample' refers to estimates for full sample of manufacturing industries (columns 1-2); full-sample regressions include controls for HCI sectors (Targeted x Year). 'Non-HCI Sample' refers to sample excluding treated industry. Controls refer to pre-1973 averages for wagebill, firm size, total costs, and labor productivity (interacted with time effects). Network Controls refer to 1970 eigenvalue centrality and total network degrees interacted with time. All regressions include controls for direct backward interacted with time. Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

[*] Source for Panel A - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1970-1986.

[†] Source for Panel B - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1967-1986.

Table E3: Average Impact of Total (*Leontief*) Linkages on Output, Before and After 1973

	Outcome - Real value added (ihs)							
	Panel A) 5-Digit Panel, 1970 - 1986				Panel B) 4-Digit Panel, 1967 - 1986			
	Full Sample		*Non-HCI Sample*		*Full Sample*		*Non-HCI Sample*	
	1	2	3	4	1	2	3	4
Post X Forward Link	0.0119**	0.0119*	0.0352*	0.0331*	0.0178**	0.0195***	0.0220	0.0287*
	(0.00441)	(0.00460)	(0.0150)	(0.0147)	(0.00548)	(0.00570)	(0.0131)	(0.0125)
Post X Backward Link	-0.000351	-0.0000801	0.00137	0.00155	-0.00952	-0.00982	-0.0251	-0.0216
	(0.00325)	(0.00326)	(0.00373)	(0.00371)	(0.00584)	(0.00541)	(0.0166)	(0.0146)
Industry Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Targeted X Year	Yes	Yes	No	No	Yes	Yes	No	No
Network Controls	No	Yes	No	Yes	No	Yes	No	Yes
R-Squared	0.763	0.764	0.765	0.768	0.829	0.832	0.813	0.818
Observations	4726	4726	3111	3111	1760	1760	1180	1180
Clusters	278	278	183	183	88	88	59	59

Note:
Average differences-in-differences estimates, before and after 1973. Regressions interact linkage measure with Post 1973 indicator. For these estimates, both linkage interactions are shown (forward and backward); whereas, dynamic estimates presented only linkages for the interaction of interest (forward or backward). Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

[*] Source for Panel A - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1970-1986.

[†] Source for Panel B - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1967-1986.

Table E4: Average Impact of *Leontief* Linkages on Output Prices, Before and After 1973

	Outcome - Output prices (ihs)							
	Panel A) 5-Digit Panel, 1970 - 1986				Panel B) 4-Digit Panel, 1967 - 1986			
	Full Sample		*Non-HCI Sample*		*Full Sample*		*Non-HCI Sample*	
	1	2	3	4	1	2	3	4
Post X Forward Link	-0.00217**	-0.00227**	-0.00399*	-0.00387	-0.00450**	-0.00469**	-0.00660**	-0.00677**
	(0.000771)	(0.000765)	(0.00198)	(0.00196)	(0.00164)	(0.00162)	(0.00232)	(0.00225)
Post X Backward Link	0.00111***	0.00101***	0.000993***	0.000909**	0.00333*	0.00322*	0.00757**	0.00716**
	(0.000243)	(0.000237)	(0.000290)	(0.000280)	(0.00164)	(0.00158)	(0.00274)	(0.00266)
Industry Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Targeted X Year	Yes	Yes	No	No	Yes	Yes	No	No
Network Controls	No	Yes	No	Yes	No	Yes	No	Yes
R-Squared	0.951	0.952	0.941	0.943	0.954	0.956	0.952	0.954
Observations	4722	4722	3107	3107	1751	1751	1177	1177
Clusters	278	278	183	183	88	88	59	59

Note:
Average differences-in-differences estimates, before and after 1973. Regressions interact linkage measure with Post 1973 indicator. For these estimates, both linkage interactions are shown (forward and backward); whereas, dynamic estimates presented only linkages for the interaction of interest (forward or backward). Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

[*] Source for Panel A - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1970-1986.

[†] Source for Panel B - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1967-1986.

Table E5: Average Impact of Direct Linkages on Industrial Development Outcomes, Before and After 1973

	A) 5-Digit Panel, 1970 - 1986								**B) 4-Digit Panel, 1967 - 1986**							
	Employment		Avg. Wage.		Num. Plants		Labor Prod.		Employment		Avg. Wage.		Num. Plants		Labor Prod.	
	Full	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Post X Forward Link	0.0169**	0.0188*	0.0112*	0.00730	0.0135***	0.0171***	0.0146*	0.0122	0.0137*	0.0170*	0.0109	0.00632	0.0153***	0.0215***	0.00251	-0.00155
	(0.00521)	(0.00738)	(0.00515)	(0.00614)	(0.00318)	(0.00417)	(0.00627)	(0.00808)	(0.00589)	(0.00822)	(0.00593)	(0.00771)	(0.00445)	(0.00502)	(0.00488)	(0.00671)
Post X Backward Link	-0.0120*	-0.0138*	-0.00972	-0.00923	-0.00387	-0.00617	-0.00871	-0.00824	-0.00475	-0.0146**	-0.0160**	-0.0213*	0.00154	-0.00709	-0.00799	-0.0112
	(0.00534)	(0.00663)	(0.00520)	(0.00679)	(0.00285)	(0.00337)	(0.00570)	(0.00743)	(0.00526)	(0.00465)	(0.00567)	(0.00874)	(0.00515)	(0.00465)	(0.00406)	(0.00569)
Industry Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Targeted X Year	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
R-Squared	0.784	0.803	0.632	0.615	0.855	0.866	0.628	0.611	0.846	0.850	0.725	0.665	0.885	0.893	0.748	0.704
Observations	4726	3111	4726	3111	4726	3111	4726	3111	1760	1180	1760	1180	1760	1180	1760	1180
Clusters	278	183	278	183	278	183	278	183	88	59	88	59	88	59	88	59

Note:
Average differences-in-differences estimates, before and after 1973. Regressions interact linkage measure with Post 1973 indicator. For these estimates, both linkage interactions are shown (forward and backward); whereas, dynamic estimates presented only linkages for the interaction of interest (forward or backward). Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

* Source for Panel A - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1970-1986.

† Source for Panel B - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1967-1986.

Table E6: Average Impact of Total (*Leontief*) Linkages on Industrial Development , Before and After 1973

	A) 5-Digit Panel, 1970 - 1986								**B) 4-Digit Panel, 1967 - 1986**							
	Employment		Avg. Wage.		Num. Plants		Labor Prod.		Employment		Avg. Wage.		Num. Plants		Labor Prod.	
	Full	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Post X Forward Link	0.00976**	0.0269*	0.00336	0.0134	0.00750***	0.0219**	0.00298	0.0149	0.0148**	0.0229	0.0120*	0.00689	0.0118***	0.0295***	0.00528	-0.00389
	(0.00366)	(0.0108)	(0.00318)	(0.00987)	(0.00222)	(0.00661)	(0.00365)	(0.0119)	(0.00435)	(0.0121)	(0.00501)	(0.0118)	(0.00344)	(0.00806)	(0.00377)	(0.0100)
Post X Backward Link	-0.000657	0.00102	0.000875	0.00195	0.000527	0.00158	0.00275	0.00388	-0.00663	-0.0139	-0.00930*	-0.0230	-0.00247	-0.00202	-0.00416	-0.0142
	(0.00255)	(0.00279)	(0.00268)	(0.00304)	(0.00114)	(0.00130)	(0.00290)	(0.00330)	(0.00366)	(0.0104)	(0.00451)	(0.0118)	(0.00230)	(0.00579)	(0.00343)	(0.0103)
Industry Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Targeted X Year	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
R-Squared	0.783	0.802	0.630	0.614	0.854	0.867	0.627	0.612	0.848	0.852	0.724	0.670	0.885	0.892	0.748	0.706
Observations	4726	3111	4726	3111	4726	3111	4726	3111	1760	1180	1760	1180	1760	1180	1760	1180
Clusters	278	183	278	183	278	183	278	183	88	59	88	59	88	59	88	59

Note:
Average differences-in-differences estimates, before and after 1973. Regressions interact linkage measure with Post 1973 indicator. For these estimates, both linkage interactions are shown (forward and backward); whereas, dynamic estimates presented only linkages for the interaction of interest (forward or backward). Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

* Source for Panel A - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1970-1986.

† Source for Panel B - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1967-1986.

Table E7: Impact of *Direct* vs.*Total* Forward Linkages on Downstream Exports

	Panel A) Dependent variable - Direct forward linkages										Panel B) Dependent variable - Total (Leontief) forward linkages									
	RCA (ihs)		RCA (ln)		RCA		I[RCA>1]		Export Value		RCA (ihs)		RCA (ln)		RCA		I[RCA>1]		Export Value	
	Full	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
1965 X Forward Link	0.289*	0.349*	0.141	0.322	0.985	1.171	0.249**	0.291**	1.100	1.322	0.117	0.135	0.0217	0.0435	0.245	0.282	0.122**	0.127**	-0.00559	0.00921
	(0.143)	(0.165)	(0.596)	(0.641)	(0.674)	(0.792)	(0.0876)	(0.0979)	(1.832)	(1.876)	(0.0956)	(0.101)	(0.281)	(0.297)	(0.475)	(0.502)	(0.0453)	(0.0483)	(0.904)	(0.927)
1966 X Forward Link	0.166	0.207	-0.326	-0.224	0.816	0.979	0.109	0.123	-0.140	-0.0438	0.0768	0.0918	-0.298	-0.245	0.159	0.162	0.0742	0.0709	-1.117	-1.064
	(0.135)	(0.154)	(0.553)	(0.599)	(0.565)	(0.666)	(0.0797)	(0.0885)	(1.674)	(1.697)	(0.0905)	(0.0953)	(0.278)	(0.289)	(0.362)	(0.390)	(0.0481)	(0.0503)	(0.871)	(0.892)
1967 X Forward Link	0.128	0.145	-0.254	-0.171	0.563	0.657	0.106	0.126	-0.283	-0.0821	0.0683	0.0812	-0.0552	-0.0102	-0.111	-0.122	0.0776	0.0852	-0.366	-0.102
	(0.126)	(0.143)	(0.519)	(0.543)	(0.523)	(0.616)	(0.0770)	(0.0862)	(1.581)	(1.661)	(0.0778)	(0.0818)	(0.253)	(0.259)	(0.285)	(0.310)	(0.0470)	(0.0498)	(0.823)	(0.845)
1968 X Forward Link	0.135	0.150	0.0705	0.0567	0.0435	0.00851	0.157*	0.178*	1.016	1.382	0.0671	0.0730	-0.149	-0.112	-0.112	-0.140	0.0877*	0.0933*	-0.760	-0.387
	(0.115)	(0.120)	(0.515)	(0.541)	(0.464)	(0.530)	(0.0695)	(0.0759)	(1.580)	(1.596)	(0.0689)	(0.0691)	(0.246)	(0.249)	(0.214)	(0.222)	(0.0395)	(0.0407)	(0.859)	(0.859)
1969 X Forward Link	0.0700	0.0960	-0.313	-0.115	0.172	0.224	0.0756	0.103	-0.591	0.381	0.0301	0.0436	-0.204	-0.129	-0.0609	-0.0598	0.0309	0.0377	-0.458	0.0633
	(0.0934)	(0.104)	(0.434)	(0.466)	(0.380)	(0.448)	(0.0616)	(0.0685)	(1.464)	(1.562)	(0.0583)	(0.0605)	(0.236)	(0.243)	(0.173)	(0.189)	(0.0414)	(0.0429)	(0.704)	(0.731)
1970 X Forward Link	-0.00503	0.0112	-0.280	-0.322	-0.127	-0.116	0.00474	0.0260	0.431	1.093	-0.0210	-0.00751	-0.373	-0.339	-0.121	-0.107	0.00797	0.00920	-0.474	-0.164
	(0.0913)	(0.101)	(0.432)	(0.469)	(0.463)	(0.547)	(0.0588)	(0.0600)	(1.303)	(1.457)	(0.0614)	(0.0642)	(0.230)	(0.241)	(0.189)	(0.204)	(0.0381)	(0.0392)	(0.788)	(0.830)
1971 X Forward Link	0.0462	0.0379	0.0808	0.0274	0.00647	-0.0198	0.0366	0.0405	2.117	2.014	-0.00480	-0.00130	-0.108	-0.138	0.0414	-0.00230	-0.00809	-0.00882	0.740	0.629
	(0.0834)	(0.0946)	(0.456)	(0.485)	(0.321)	(0.379)	(0.0589)	(0.0639)	(1.396)	(1.496)	(0.0371)	(0.0400)	(0.201)	(0.212)	(0.199)	(0.215)	(0.0297)	(0.0318)	(0.775)	(0.814)
1972 X Forward Link	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
1973 X Forward Link	0.0723	0.0440	-0.118	-0.0519	0.358	0.360	0.0569	0.0455	-0.122	0.318	0.00779	0.00138	0.0170	0.0649	0.227	0.248	-0.0142	-0.0230	0.242	0.397
	(0.0698)	(0.0810)	(0.338)	(0.367)	(0.240)	(0.285)	(0.0616)	(0.0719)	(1.129)	(1.277)	(0.0470)	(0.0505)	(0.175)	(0.186)	(0.214)	(0.235)	(0.0350)	(0.0378)	(0.635)	(0.670)
1974 X Forward Link	0.265*	0.268*	0.740	0.920*	0.457	0.609	0.208**	0.193*	1.642	2.436	0.0745	0.0754	0.411	0.490*	0.0902	0.151	0.0782*	0.0695	0.720	0.983
	(0.117)	(0.120)	(0.411)	(0.458)	(0.501)	(0.519)	(0.0786)	(0.0860)	(1.107)	(1.246)	(0.0656)	(0.0669)	(0.215)	(0.228)	(0.380)	(0.390)	(0.0369)	(0.0388)	(0.663)	(0.693)
1975 X Forward Link	0.0434	0.0548	-0.464	-0.270	-0.116	0.0687	0.0439	0.0377	0.133	0.427	-0.00322	0.00697	-0.132	-0.0178	-0.182	-0.125	0.0152	0.0132	-0.114	0.136
	(0.110)	(0.107)	(0.395)	(0.438)	(0.547)	(0.536)	(0.0755)	(0.0805)	(1.058)	(1.181)	(0.0584)	(0.0572)	(0.204)	(0.217)	(0.475)	(0.479)	(0.0347)	(0.0358)	(0.699)	(0.723)
1976 X Forward Link	0.272*	0.215	0.425	0.446	0.723	0.591	0.157	0.125	0.781	1.746	0.162*	0.148*	0.413	0.506*	0.438	0.422	0.0955**	0.0813*	1.472*	1.991**
	(0.119)	(0.131)	(0.423)	(0.460)	(0.549)	(0.637)	(0.0804)	(0.0915)	(1.079)	(1.147)	(0.0680)	(0.0715)	(0.234)	(0.248)	(0.473)	(0.495)	(0.0347)	(0.0372)	(0.677)	(0.701)
1977 X Forward Link	0.323*	0.165	0.102	-0.194	0.875	0.547	0.139	0.0630	-1.169	-1.054	0.120	0.103	0.223	0.279	0.427	0.411	0.0418	0.0319	0.271	0.634
	(0.136)	(0.145)	(0.457)	(0.485)	(0.605)	(0.696)	(0.0846)	(0.0880)	(1.296)	(1.404)	(0.0650)	(0.0668)	(0.218)	(0.230)	(0.470)	(0.486)	(0.0339)	(0.0356)	(0.721)	(0.754)
1978 X Forward Link	0.355**	0.254	0.598	0.541	0.951	0.707	0.136	0.109	0.436	1.016	0.177**	0.169*	0.590**	0.651**	0.599	0.612	0.0575	0.0541	0.912	1.304*
	(0.131)	(0.142)	(0.442)	(0.483)	(0.600)	(0.683)	(0.0857)	(0.0908)	(1.331)	(1.456)	(0.0658)	(0.0681)	(0.208)	(0.220)	(0.468)	(0.487)	(0.0413)	(0.0428)	(0.626)	(0.655)
1979 X Forward Link	0.437**	0.348*	0.981*	0.822	0.998	0.814	0.263**	0.204*	1.890	2.236	0.245***	0.242**	0.690***	0.783***	0.702	0.746	0.154***	0.143**	1.514*	1.993**
	(0.139)	(0.156)	(0.468)	(0.505)	(0.639)	(0.739)	(0.0893)	(0.0956)	(1.307)	(1.419)	(0.0737)	(0.0773)	(0.206)	(0.221)	(0.488)	(0.510)	(0.0435)	(0.0460)	(0.685)	(0.729)
1980 X Forward Link	0.429**	0.357*	0.907*	1.032*	1.003	0.829	0.266**	0.209*	1.241	2.547	0.282***	0.277***	0.851***	0.970***	0.853	0.911	0.151**	0.137**	2.119**	2.689***
	(0.147)	(0.163)	(0.457)	(0.494)	(0.714)	(0.830)	(0.0876)	(0.0934)	(1.281)	(1.385)	(0.0780)	(0.0821)	(0.231)	(0.243)	(0.512)	(0.538)	(0.0476)	(0.0498)	(0.762)	(0.789)
1981 X Forward Link	0.503**	0.439*	0.951	1.086*	1.400*	1.266	0.336***	0.306**	2.259	3.492*	0.307***	0.303***	0.823***	0.965***	0.964	1.045	0.187***	0.181***	2.056**	2.680***
	(0.155)	(0.172)	(0.486)	(0.537)	(0.678)	(0.780)	(0.0942)	(0.102)	(1.401)	(1.548)	(0.0828)	(0.0863)	(0.230)	(0.246)	(0.534)	(0.569)	(0.0498)	(0.0529)	(0.689)	(0.723)
1982 X Forward Link	0.589***	0.504**	1.449**	1.522**	1.695*	1.530	0.333***	0.290**	3.693**	5.087***	0.303***	0.292**	0.992***	1.096***	1.004	1.071	0.179***	0.168**	2.729***	3.383***
	(0.165)	(0.184)	(0.499)	(0.555)	(0.720)	(0.837)	(0.0931)	(0.0996)	(1.334)	(1.459)	(0.0904)	(0.0938)	(0.246)	(0.261)	(0.533)	(0.565)	(0.0519)	(0.0542)	(0.740)	(0.775)
1983 X Forward Link	0.682***	0.571**	1.527**	1.463**	2.059**	1.769*	0.367***	0.313**	2.482*	3.196*	0.336***	0.326***	1.108***	1.178***	1.208*	1.265*	0.180***	0.162**	2.827***	3.199***
	(0.161)	(0.175)	(0.495)	(0.547)	(0.728)	(0.831)	(0.0958)	(0.102)	(1.247)	(1.373)	(0.0879)	(0.0908)	(0.261)	(0.277)	(0.529)	(0.563)	(0.0491)	(0.0514)	(0.716)	(0.751)
1984 X Forward Link	0.711***	0.614***	1.658***	1.621**	2.188**	2.025*	0.342***	0.268**	3.028*	3.813**	0.356***	0.347***	0.955***	1.039***	1.359**	1.427*	0.155**	0.137*	2.304**	2.711**
	(0.161)	(0.179)	(0.466)	(0.509)	(0.743)	(0.859)	(0.0911)	(0.0957)	(1.234)	(1.310)	(0.0867)	(0.0899)	(0.270)	(0.284)	(0.522)	(0.562)	(0.0519)	(0.0539)	(0.877)	(0.903)
1985 X Forward Link	0.761***	0.657***	1.868***	1.819***	2.348**	2.215*	0.425***	0.359***	3.002*	3.347*	0.373***	0.362***	1.073***	1.150***	1.396**	1.466**	0.204***	0.183***	2.293**	2.590***
	(0.160)	(0.176)	(0.477)	(0.523)	(0.748)	(0.868)	(0.0950)	(0.102)	(1.269)	(1.362)	(0.0874)	(0.0899)	(0.252)	(0.265)	(0.511)	(0.553)	(0.0492)	(0.0518)	(0.699)	(0.726)
1986 X Forward Link	0.733***	0.645***	1.858***	1.901***	2.173**	2.104*	0.355***	0.279**	3.684**	4.944**	0.357***	0.356***	1.216***	1.322***	1.305*	1.447**	0.169***	0.143**	3.072***	3.678***
	(0.154)	(0.171)	(0.499)	(0.558)	(0.704)	(0.822)	(0.0924)	(0.0981)	(1.376)	(1.508)	(0.0888)	(0.0918)	(0.292)	(0.307)	(0.513)	(0.557)	(0.0477)	(0.0497)	(0.888)	(0.918)
Industry Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Targeted X Year	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
R-Squared	0.708	0.725	0.708	0.715	0.614	0.616	0.569	0.590	0.701	0.705	0.706	0.722	0.708	0.716	0.614	0.616	0.567	0.588	0.702	0.706
Observations	10736	8822	10736	8822	10736	8822	10736	8822	10676	8787	10736	8822	10736	8822	10736	8822	10736	8822	10676	8787
Clusters	488	401	488	401	488	401	488	401	488	401	488	401	488	401	488	401	488	401	488	401
Joint Test of Pre-Trend (F-Test)	1.747	1.751	1.045	1.039	1.066	1.022	1.597	1.409	1.144	0.677	0.697	0.596	1.045	0.678	0.897	0.881	1.372	1.300	1.588	0.737
Joint Test of Pre-Trend (P-Values)	0.044	0.044	0.407	0.413	0.386	0.430	0.076	0.145	0.316	0.797	0.778	0.869	0.407	0.796	0.562	0.580	0.162	0.204	0.078	0.737

Note:
Table shows dynamic differences-in-differences estimates for the relationship between forward linkage exposure to HCI and export development. RCA is revealed comparative advantage index. RCA also normalized ihs and natural ln for completenes. Indicator I[RCA>1] is dummy equal to 1 when RCA>1, 0 otherwise. Export values are ihs normalized to accomodate 0s. Estimates are relative to, 1972, the year before HCI. The year 1979 corresponds to collapse of Park regime. Panel A reports 'Year X Forward Linkage' estimates for direct links. Panel B reports 'Year X Forward Linkage' estimates for total forward or Leontief linkages.. Specificiations are two-way fixed effect OLS estimates, and include year and industry effects. All regressions include controls for backward interacted with time. Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

* SITC Trade data - UN-COMTRADE

† Direct and Total Linkaes Linkages - Calculated from the 1970 domestic I-O accounts. Bank of Korea.

Table E8: Impact of Direct Forward Linkages on Downstream Input Use

	Panel A) 5-Digit Panel, 1970 - 1986						Panel B) 4-Digit Panel, 1967 - 1986					
	Material Cost		*Total Investment*		*Equipment Investment*		*Materials Cost*		*Total Investment*		*Equipment Investment*	
	Full	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*	*Full*	*Non-HCI*
	1	2	3	4	5	6	1	2	3	4	5	6
1967 X Forward Link							0.00906	0.00841	0.0204*	0.0206		
							(0.00590)	(0.00908)	(0.00837)	(0.0118)		
1968 X Forward Link							0.0131*	0.0164	0.0123	0.00875	0.0193*	0.0198
							(0.00518)	(0.00827)	(0.0107)	(0.0159)	(0.00908)	(0.0123)
1969 X Forward Link							0.00866	0.0109	0.0125	0.0140	0.0152	0.0180
							(0.00489)	(0.00796)	(0.00844)	(0.0126)	(0.00942)	(0.0141)
1970 X Forward Link	0.000401	0.00187	0.00588	0.000511	0.0104	0.00237	-0.00229	-0.000814	0.00649	0.00835	0.00611	0.00627
	(0.00551)	(0.00501)	(0.00776)	(0.00735)	(0.00793)	(0.00841)	(0.00473)	(0.00375)	(0.00664)	(0.00609)	(0.00883)	(0.00999)
1971 X Forward Link	-0.00768	-0.00671	0.00145	0.00512	0.00596	0.00645	0.00180	0.00257	0.00574	0.00494	0.00942	0.00956
	(0.00550)	(0.00741)	(0.00620)	(0.00781)	(0.00683)	(0.00767)	(0.00263)	(0.00228)	(0.00785)	(0.0110)	(0.00675)	(0.00849)
1972 X Forward Link	0	0	0	0	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
1973 X Forward Link	-0.000944	-0.00197	0.00338	-0.0000880	0.0149*	0.00852	0.00111	-0.00328	0.00636	0.00465	0.0158*	0.0139
	(0.00479)	(0.00597)	(0.00675)	(0.00805)	(0.00678)	(0.00843)	(0.00280)	(0.00398)	(0.00470)	(0.00602)	(0.00686)	(0.00888)
1974 X Forward Link	-0.00166	-0.00135	0.00183	0.000193	0.00589	0.00640	0.00591	0.00591	0.0120	0.00469	0.0142*	0.00782
	(0.00544)	(0.00789)	(0.00593)	(0.00725)	(0.00546)	(0.00721)	(0.00554)	(0.00876)	(0.00741)	(0.00804)	(0.00682)	(0.00639)
1975 X Forward Link	0.0130	0.0101	0.0168*	0.0197	0.0140	0.0207*	0.0114	0.0154	0.0224**	0.0231	0.0226**	0.0238*
	(0.00781)	(0.0103)	(0.00723)	(0.0108)	(0.00734)	(0.0104)	(0.00628)	(0.00965)	(0.00831)	(0.0116)	(0.00830)	(0.0105)
1976 X Forward Link	0.0247**	0.0265*	0.0202**	0.0226*	0.0208**	0.0225*	0.0161	0.0194	0.0241**	0.0256*	0.0247*	0.0273*
	(0.00918)	(0.0122)	(0.00686)	(0.00907)	(0.00763)	(0.00937)	(0.00988)	(0.0146)	(0.00913)	(0.0112)	(0.0110)	(0.0135)
1977 X Forward Link	0.0313**	0.0332*	0.0275***	0.0279**	0.0240**	0.0255*	0.0217*	0.0274	0.0222**	0.0227*	0.0269**	0.0257*
	(0.00972)	(0.0135)	(0.00728)	(0.0107)	(0.00793)	(0.0113)	(0.0109)	(0.0171)	(0.00719)	(0.00920)	(0.00854)	(0.0115)
1978 X Forward Link	0.0192*	0.0172	0.0244***	0.0218*	0.0250**	0.0252*	0.0196	0.0264	0.0246**	0.0216*	0.0250*	0.0245
	(0.00889)	(0.0118)	(0.00724)	(0.00973)	(0.00761)	(0.0101)	(0.0108)	(0.0170)	(0.00864)	(0.00961)	(0.0103)	(0.0125)
1979 X Forward Link	0.0242*	0.0208	0.0219**	0.00926	0.0147	0.0000331	0.0221*	0.0281	0.0194*	0.00849	0.0123	-0.00206
	(0.00990)	(0.0123)	(0.00771)	(0.0103)	(0.00832)	(0.0112)	(0.0107)	(0.0167)	(0.00883)	(0.00940)	(0.0124)	(0.0158)
1980 X Forward Link	0.0262**	0.0259	0.0238**	0.0228*	0.0137	0.0120	0.0201	0.0293	0.0204*	0.0243	0.00864	0.00829
	(0.00974)	(0.0133)	(0.00734)	(0.0104)	(0.00737)	(0.00997)	(0.0113)	(0.0177)	(0.00937)	(0.0136)	(0.00931)	(0.0122)
1981 X Forward Link	0.0236*	0.0209	0.0170*	0.0108	0.0152*	0.0110	0.0217	0.0306	0.0170*	0.0131	0.0156	0.0145
	(0.00933)	(0.0125)	(0.00716)	(0.0102)	(0.00738)	(0.0105)	(0.0114)	(0.0172)	(0.00711)	(0.00942)	(0.00808)	(0.0103)
1982 X Forward Link	0.0263**	0.0276*	0.0249**	0.0234*	0.0165*	0.0121	0.0210	0.0296	0.0235**	0.0179	0.0207*	0.0116
	(0.00963)	(0.0133)	(0.00765)	(0.0107)	(0.00783)	(0.0106)	(0.0115)	(0.0178)	(0.00889)	(0.0107)	(0.00984)	(0.0116)
1983 X Forward Link	0.00102	0.00620	0.00887	0.00743			0.00754	0.00510	0.0232**	0.0171		
	(0.00851)	(0.0109)	(0.00930)	(0.0115)			(0.00591)	(0.00916)	(0.00756)	(0.00872)		
1984 X Forward Link	0.00727	0.0116	0.0125	0.00838			0.00903	0.00571	0.0256**	0.0148		
	(0.00928)	(0.0119)	(0.00955)	(0.0117)			(0.00570)	(0.00877)	(0.00847)	(0.00980)		
1985 X Forward Link	0.00107	0.00784	0.00999	0.0139			0.00943	0.00859	0.0201*	0.0156		
	(0.00950)	(0.0117)	(0.00975)	(0.0117)			(0.00607)	(0.00853)	(0.00796)	(0.0102)		
1986 X Forward Link	0.00996	0.0174	0.0125	0.0126			0.0111	0.00965	0.0218*	0.0163		
	(0.0100)	(0.0131)	(0.00998)	(0.0123)			(0.00666)	(0.00930)	(0.00840)	(0.00979)		
Industry Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Targeted X Year	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
R-Squared	0.777	0.789	0.782	0.787	0.781	0.782	0.846	0.838	0.848	0.843	0.844	0.832
Observations	4726	3111	4663	3073	3551	2341	1760	1180	1752	1175	1316	883
Clusters	278	183	275	181	275	181	88	59	88	59	88	59
Joint Test of Pre-Trend (F-Test)	1.194	1.656	0.478	0.169	0.720	0.391	1.552	2.622	0.979	0.957	1.066	1.053
Joint Test of Pre-Trend (P-Values)	0.314	0.162	0.752	0.954	0.579	0.815	0.135	0.011	0.467	0.490	0.395	0.408

Note:

Table shows dynamic differences-in-differences estimates for the relationship between direct forward linkages linkage exposure to HCI and input use, capital investment, and inventory investment.Material Costs are real total input material costs. Total Investment is real gross fixed capital investment. Equipment Investment is investment in equipment and machinery assets. All are ihs normalized for lumpy investment. Estimates are relative to 1972, the year before HCI. The year 1979 corresponds to the collapse of Park regime. Panel A shows estimates using shorter 5-digit industrial data (1970-1986). Panel B shows estimates using longer, aggregate 4-digit industrial data (1967-1986). Specificiations are two-way fixed effect OLS estimates, and include year and industry effects. All regressions control for direct backward linkages interacted with time.Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

* Source for Panel A - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1970-1986.

† Source for Panel B - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1967-1986.

Table F1: Impact of Direct Backward Linkages on Upstream Output

	Outcome - Real value added (ihs)							
	Panel A) 5-Digit Panel, 1970 - 1986				Panel B) 4-Digit Panel, 1967 - 1986			
	Full Sample		Non-HCI Sample		Full Sample		Non-HCI Sample	
	1	2	3	4	1	2	3	4
1967 X Backward Link					0.00946*	0.00926*	0.0185*	0.0184*
					(0.00410)	(0.00430)	(0.00793)	(0.00708)
1968 X Backward Link					0.00939*	0.00939*	0.0167*	0.0167*
					(0.00388)	(0.00398)	(0.00806)	(0.00687)
1969 X Backward Link					0.0116	0.0122	0.0201	0.0205
					(0.00644)	(0.00695)	(0.0115)	(0.0104)
1970 X Backward Link	0.00434	0.00370	0.0126*	0.0118*	0.00278	0.00261	0.0114***	0.0112**
	(0.00509)	(0.00508)	(0.00513)	(0.00508)	(0.00423)	(0.00436)	(0.00314)	(0.00327)
1971 X Backward Link	-0.00431	-0.00455	-0.00297	-0.00303	0.000467	0.000393	0.00414*	0.00404
	(0.00479)	(0.00477)	(0.00601)	(0.00590)	(0.00268)	(0.00275)	(0.00207)	(0.00220)
1972 X Backward Link	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
1973 X Backward Link	-0.00765	-0.00700	-0.00849	-0.00784	-0.000393	-0.000433	-0.00417	-0.00417
	(0.00542)	(0.00541)	(0.00691)	(0.00690)	(0.00332)	(0.00348)	(0.00379)	(0.00383)
1974 X Backward Link	-0.000873	-0.000245	-0.000609	0.0000776	0.00512*	0.00502	0.00364	0.00360
	(0.00416)	(0.00419)	(0.00533)	(0.00536)	(0.00250)	(0.00254)	(0.00341)	(0.00353)
1975 X Backward Link	-0.0132	-0.0125	-0.0139	-0.0128	-0.00386	-0.00440	-0.00701	-0.00731
	(0.00863)	(0.00865)	(0.0113)	(0.0112)	(0.00362)	(0.00355)	(0.00617)	(0.00541)
1976 X Backward Link	-0.00841	-0.00854	-0.00224	-0.00165	0.00245	0.00248	0.00332	0.00334
	(0.00626)	(0.00634)	(0.00706)	(0.00699)	(0.00572)	(0.00596)	(0.00799)	(0.00851)
1977 X Backward Link	-0.0149*	-0.0145*	-0.0129	-0.0117	-0.000555	-0.00105	-0.00370	-0.00414
	(0.00686)	(0.00694)	(0.00862)	(0.00864)	(0.00623)	(0.00659)	(0.00935)	(0.0101)
1978 X Backward Link	-0.00990	-0.00922	-0.00823	-0.00703	-0.00336	-0.00386	-0.00914	-0.00963
	(0.0100)	(0.0100)	(0.0131)	(0.0130)	(0.00685)	(0.00718)	(0.00920)	(0.00992)
1979 X Backward Link	-0.0136	-0.0136	-0.0103	-0.00952	-0.00177	-0.00218	-0.00962	-0.0101
	(0.0116)	(0.0117)	(0.0153)	(0.0152)	(0.00729)	(0.00766)	(0.00919)	(0.00994)
1980 X Backward Link	-0.0154	-0.0154	-0.0142	-0.0136	-0.00475	-0.00525	-0.0142	-0.0147
	(0.0107)	(0.0108)	(0.0142)	(0.0142)	(0.00751)	(0.00794)	(0.0103)	(0.0109)
1981 X Backward Link	-0.0158	-0.0155	-0.0165	-0.0158	-0.00721	-0.00747	-0.0180	-0.0183
	(0.0100)	(0.0100)	(0.0132)	(0.0132)	(0.00845)	(0.00878)	(0.00967)	(0.0102)
1982 X Backward Link	-0.0162	-0.0162	-0.0170	-0.0165	-0.00971	-0.0103	-0.0235*	-0.0240*
	(0.00930)	(0.00937)	(0.0122)	(0.0122)	(0.00954)	(0.0100)	(0.0111)	(0.0118)
1983 X Backward Link	-0.0293**	-0.0290**	-0.0326**	-0.0318**	-0.0132	-0.0134	-0.0211**	-0.0212**
	(0.00931)	(0.00937)	(0.0120)	(0.0120)	(0.00740)	(0.00770)	(0.00632)	(0.00686)
1984 X Backward Link	-0.0243**	-0.0238**	-0.0257**	-0.0246**	-0.0136	-0.0135	-0.0222**	-0.0222**
	(0.00777)	(0.00782)	(0.00957)	(0.00944)	(0.00769)	(0.00797)	(0.00691)	(0.00722)
1985 X Backward Link	-0.0331**	-0.0325**	-0.0367*	-0.0356*	-0.0151	-0.0150	-0.0270***	-0.0269***
	(0.0120)	(0.0120)	(0.0158)	(0.0157)	(0.00849)	(0.00871)	(0.00646)	(0.00664)
1986 X Backward Link	-0.0345**	-0.0339**	-0.0408*	-0.0399*	-0.0160	-0.0158	-0.0303***	-0.0302***
	(0.0124)	(0.0124)	(0.0162)	(0.0161)	(0.00924)	(0.00948)	(0.00647)	(0.00671)
Industry Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Targeted X Year	Yes	Yes	No	No	Yes	Yes	No	No
Network Controls	No	Yes	No	Yes	No	Yes	No	Yes
R-Squared	0.770	0.771	0.773	0.775	0.831	0.834	0.815	0.820
Observations	4726	4726	3111	3111	1760	1760	1180	1180
Clusters	278	278	183	183	88	88	59	59
Joint Test of Pre-Trend (F-Test)	0.734	1.145	1.676	1.799	1.899	1.501	4.047	4.317
Joint Test of Pre-Trend (P-Values)	0.569	0.336	0.157	0.131	0.056	0.153	0.000	0.000

Note:

Table shows dynamic differences-in-differences estimates for the relationship between direct backward linkage exposure to Heavy and Chemical Industry Drive sectors and output, real value added per worker (ihs) . Estimates are relative to 1972, the year before HCI. All specifications include industry and year effects. Panel A shows estimates using detailed 5-digit level industrial data (1970-1986). Panel B shows estimates using longer, aggregate 4-digit level industrial data (1967-1986). 'Full sample' refers to estimates for full sample of manufacturing industries (columns 1-2); full-sample regressions include controls for HCI sectors (Targeted x Year). 'Non-HCI Sample' refers to sample excluding treated industry. Controls refer to pre-1973 averages for wagebill, firm size, total costs, and labor productivity (interacted with time effects). Network Controls refer to 1970 eigenvalue centrality and total network degrees interacted with time. All regressions include controls for direct forward interacted with time. Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

[*] Source for Panel A - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1970-1986.

[†] Source for Panel B - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1967-1986.

Table F2: Impact of Total (*Leontief*) Backward Linkages on Upstream Output

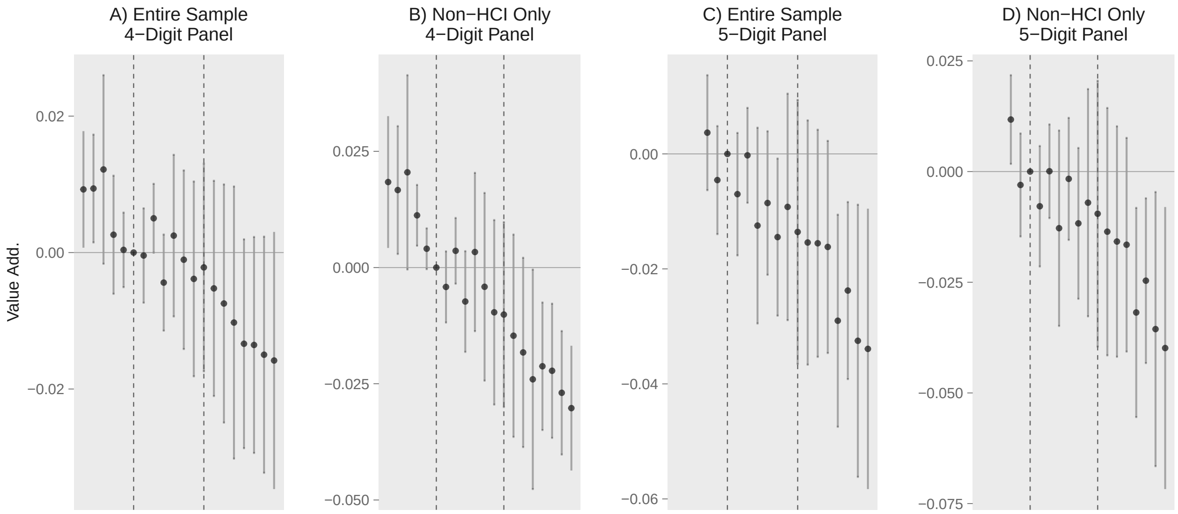
	Outcome - Real value added (ihs)							
	Panel A) 5-Digit Panel, 1970 - 1986				Panel B) 4-Digit Panel, 1967 - 1986			
	Full Sample		Non-HCI Sample		Full Sample		Non-HCI Sample	
	1	2	3	4	1	2	3	4
1967 X Backward Link					0.00778	0.00771	0.0212	0.0187
					(0.00683)	(0.00679)	(0.0216)	(0.0199)
1968 X Backward Link					0.00690	0.00691	0.0224	0.0190
					(0.00675)	(0.00662)	(0.0213)	(0.0193)
1969 X Backward Link					0.00571	0.00598	0.0229	0.0180
					(0.00696)	(0.00676)	(0.0221)	(0.0196)
1970 X Backward Link	0.00456*	0.00455*	0.00472*	0.00475*	-0.000883	-0.000958	0.000161	0.0000222
	(0.00185)	(0.00188)	(0.00200)	(0.00202)	(0.00270)	(0.00276)	(0.00707)	(0.00692)
1971 X Backward Link	-0.00199	-0.00217	-0.00189	-0.00213	-0.00146	-0.00149	-0.00281	-0.00262
	(0.00268)	(0.00271)	(0.00302)	(0.00305)	(0.00255)	(0.00261)	(0.00751)	(0.00728)
1972 X Backward Link	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
1973 X Backward Link	-0.00316	-0.00280	-0.00394	-0.00363	-0.00289	-0.00293	-0.0138	-0.0119
	(0.00294)	(0.00297)	(0.00331)	(0.00334)	(0.00382)	(0.00357)	(0.0112)	(0.0102)
1974 X Backward Link	-0.00112	-0.000760	-0.00195	-0.00162	0.00383	0.00371	0.00191	0.00330
	(0.00305)	(0.00308)	(0.00339)	(0.00343)	(0.00357)	(0.00367)	(0.0107)	(0.0100)
1975 X Backward Link	0.00308	0.00347	0.00473	0.00507	-0.00493	-0.00538	-0.0148	-0.0103
	(0.00337)	(0.00338)	(0.00373)	(0.00372)	(0.00347)	(0.00300)	(0.0116)	(0.00971)
1976 X Backward Link	0.00306	0.00288	0.00601	0.00571	-0.00550	-0.00567	-0.00618	-0.00502
	(0.00301)	(0.00305)	(0.00340)	(0.00337)	(0.00397)	(0.00391)	(0.0122)	(0.0106)
1977 X Backward Link	0.00102	0.00118	0.00411	0.00418	-0.00583	-0.00632	-0.0122	-0.0108
	(0.00363)	(0.00365)	(0.00401)	(0.00398)	(0.00415)	(0.00402)	(0.0153)	(0.0137)
1978 X Backward Link	0.00385	0.00404	0.00667	0.00675	-0.00642	-0.00691	-0.0132	-0.0114
	(0.00402)	(0.00404)	(0.00451)	(0.00449)	(0.00459)	(0.00445)	(0.0164)	(0.0146)
1979 X Backward Link	0.00210	0.00212	0.00537	0.00533	-0.00585	-0.00630	-0.0128	-0.0114
	(0.00438)	(0.00440)	(0.00473)	(0.00473)	(0.00447)	(0.00441)	(0.0162)	(0.0146)
1980 X Backward Link	0.00100	0.00100	0.00369	0.00361	-0.00736	-0.00787	-0.0174	-0.0153
	(0.00437)	(0.00440)	(0.00486)	(0.00486)	(0.00464)	(0.00441)	(0.0163)	(0.0144)
1981 X Backward Link	0.00128	0.00146	0.00401	0.00410	-0.00828	-0.00865	-0.0197	-0.0186
	(0.00434)	(0.00436)	(0.00492)	(0.00493)	(0.00520)	(0.00508)	(0.0154)	(0.0139)
1982 X Backward Link	0.00101	0.00107	0.00349	0.00348	-0.00806	-0.00861	-0.0209	-0.0190
	(0.00401)	(0.00404)	(0.00453)	(0.00455)	(0.00541)	(0.00521)	(0.0179)	(0.0161)
1983 X Backward Link	-0.000511	-0.000172	0.00166	0.00188	-0.0110	-0.0113	-0.0223	-0.0200
	(0.00394)	(0.00395)	(0.00434)	(0.00432)	(0.00611)	(0.00583)	(0.0156)	(0.0146)
1984 X Backward Link	0.000545	0.000893	0.00137	0.00159	-0.0107	-0.0108	-0.0205	-0.0186
	(0.00291)	(0.00292)	(0.00318)	(0.00315)	(0.00609)	(0.00591)	(0.0158)	(0.0151)
1985 X Backward Link	-0.00303	-0.00266	-0.00181	-0.00159	-0.00860	-0.00863	-0.0141	-0.0134
	(0.00430)	(0.00429)	(0.00467)	(0.00465)	(0.00466)	(0.00462)	(0.00791)	(0.00805)
1986 X Backward Link	-0.00207	-0.00174	-0.00104	-0.000861	-0.00955	-0.00958	-0.0169	-0.0162
	(0.00467)	(0.00467)	(0.00525)	(0.00524)	(0.00493)	(0.00489)	(0.00919)	(0.00934)
Industry Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Targeted X Year	Yes	Yes	No	No	Yes	Yes	No	No
Network Controls	No	Yes	No	Yes	No	Yes	No	Yes
R-Squared	0.765	0.766	0.769	0.771	0.831	0.834	0.817	0.821
Observations	4726	4726	3111	3111	1760	1760	1180	1180
Clusters	278	278	183	183	88	88	59	59
Joint Test of Pre-Trend (F-Test)	2.712	2.418	4.224	3.664	0.957	0.716	1.489	1.519
Joint Test of Pre-Trend (P-Values)	0.030	0.049	0.003	0.007	0.487	0.707	0.167	0.156

Note:
Table shows dynamic differences-in-differences estimates for the relationship between total (Leontief) backward linkage exposure to Heavy and Chemical Industry Drive sectors and output, real value added per worker (ihs) . Estimates are relative to 1972, the year before HCI. All specifications include industry and year effects. Panel A shows estimates using detailed 5-digit level industrial data (1970-1986). Panel B shows estimates using longer, aggregate 4-digit level industrial data (1967-1986). 'Full sample' refers to estimates for full sample of manufacturing industries (columns 1-2); full-sample regressions include controls for HCI sectors (Targeted x Year). 'Non-HCI Sample' refers to sample excluding treated industry. Controls refer to pre-1973 averages for wagebill, firm size, total costs, and labor productivity (interacted with time effects). Network Controls refer to 1970 eigenvalue centrality and total network degrees interacted with time. All regressions include controls for total (Leontief) forward interacted with time. Standard errors are clustered at the industry-level and corrected for heteroskedasticity. * Significant at the 10 percent level. ** Significant at the 5 percent level. *** Significant at the 1 percent level.

* Source for Panel A - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1970-1986.

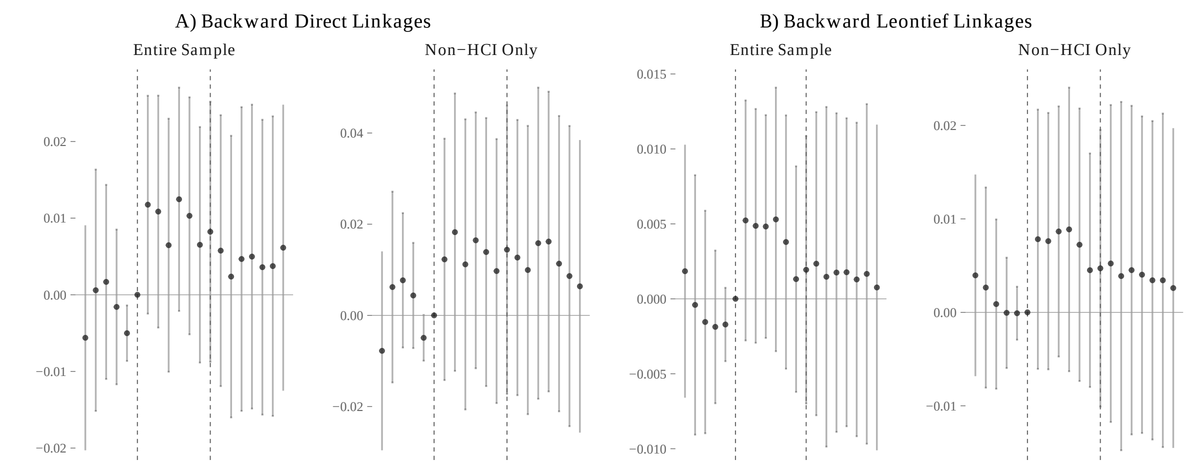
† Source for Panel B - Mining and Manufacturing Survey and Mining and Manufacturing Census: 1967-1986.

Figure F1: Relationship Between Direct Backward Linkages on Upstream Output



Notes: Figure plots dynamic differences−in−differences estimates for the relationship between direct backward linkage exposure to HCI and outcomes: real value added. Estimates are relative to, 1972, the year before HCI. The year 1979 corresponds to collapse of Park regime. Years are on the x−axis. Estimates for the effect of direct backward (Linkage X Year) linkages are on y−axis. Full sample regressions control for the main HCI x Year effect. All regressions include controls for direct forward linkage connections, interacted with time. Regression tables in Appendix. 95 percent confidence interveals are shown in gray.

Figure F2: Impact of Backward Linkages (*Direct* vs. *Total*) on Imported Goods



Notes: Figure plots dynamic differences−in−differences estimates for the relationship between (direct or total) backward linkage exposure to HCI and outcomes: real value of imports (ihs) Estimates are relative to, 1972, the year before HCI. The year 1979 corresponds to collapse of Park regime. Years are on the x−axis. Estimates for the effect of (direct or total) backward (Linkage X Year) linkages are on y−axis. Full sample regressions control for the main HCI x Year effect. All regressions include controls for (direct or total) forward linkage connections, interacted with time. 95 percent confidence interveals are shown in gray.