Democratic Consolidation, Unionization, and Growth-Enhancing Structural Change*

Nam Seok Kim†

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Abstract

Re-allocation of labor from less productive sectors to more productive sectors is essential in attaining economic growth. Because only some developing countries achieve productive labor re-allocation, it is important to address the determinant of productive labor re-allocation. Based on this motivation, this paper focuses on the role of unionization in structural change. First, using aggregated cross-country data from 31 countries, I find that a country with higher national labor union density has smaller growth-enhancing structural change if the country has a democratic political regime. Furthermore, I provide detailed dynamics by constructing an index for the degree of unionization for each sector in each region of South Korea and Taiwan. Consistent with cross-country evidence, the magnitude of growth-enhancing structural change was lowered when a sector in a region had a higher degree of unionization. In addition, this heterogeneous magnitude of structural change across the different degrees of unionization became more explicit after the legalization of democratic labor union confederations. These findings suggest that the institutional properties represented by unionization can affect the dynamics and growth implications of structural change.

Keywords: structural change, productivity, growth, labor union, democratization, democratic consolidation, South Korea, Taiwan
JEL Codes: D72, J5, O4

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†Department of Economics, Syracuse University, Syracuse, NY 13244. Email: nkim15@syr.edu.

1 Introduction

The fundamental challenge in achieving rapid and sustained economic growth is ensuring that labor flows rapidly from sectors with lower productivity levels to sectors with higher productivity levels. Rodrik et al. (2017) termed this challenge as a 'structural transformation challenge'. Some countries have succeeded in overcoming this structural transformation challenge during their development period. However, many other countries have not been successful in attaining productive re-allocation of labor. Understanding what decides the success and the failure is very important because it can explain this cross-country heterogeneity. This paper suggests that labor unionization is related to the speed and magnitude of productive labor re-allocation.

Increased bargaining power of labor unions affects the rigidity of the labor market through multiple channels, including wage level, wage dispersion, and employment level. As section 3 discusses, there have been ample theoretical elaborations and empirical clarifications which support the relationship between unionization and labor market outcomes. Despite the significance of unionization, it has received limited attention from the existing empirical literature. Among many possible reasons, two main difficulties have been preventing economists from studying it. First, for most countries, information on sector-specific rigidity, such as sector-level union density or collective bargaining coverage, is often not available. Second, most measures are from recent periods for fully developed countries, and they have limited variation in union density and collective bargaining coverage across different periods and sectors.

This paper overcomes the above empirical difficulties by quantifying the degree of unionization for each sector in each region of two East Asian new democracies. I focus on the Republic of Korea (South Korea) and the Republic of China (Taiwan), whose democratization was followed by a significant increase in the bargaining power of labor. In particular, labor unions had both quantitative and qualitative growth in the two countries during the democratic consolidation process. Labor unions gradually attained more bargaining power

in representing workers since democratization in these two nations. In addition to time-series variation in unionization, there were also both sectoral and geographical variations in the degree of unionization during the democratic consolidation process. These bountiful variations of unionization along multiple dimensions allow me to identify the marginal effect of unionization clearly. To exploit this variation in labor rigidity and bargaining power, I construct sector- and region-specific indexes for the degree of unionization in both countries. I use the variation in these indexes to empirically examine the dynamics of structural change by following the analytic framework constructed by McMillan and Rodrik (2011) and Rodrik et al. (2017). If a sector with higher productivity attracted a greater employment share, then we can say that the economy went through growth-enhancing structural change. On the other hand, if a sector with lower productivity attracted a greater employment share, it can be termed growth-reducing structural change. I find that labor rigidity, represented by the degree of unionization, can explain the heterogeneous magnitude of growth-enhancing structural change.

Specifically, I consider 7 sectors in 17 regions of South Korea and 10 sectors in 25 regions of Taiwan. My analysis covers all geographic provinces of South Korea and Taiwan. Data for South Korea start in 1989, while those for Taiwan start in 1992, both right after each country's democratization. My sample for South Korea ends in 2019, and that for Taiwan ends in 2018. Government reports used for constructing my unionization index are published by the Ministry of Employment and Labor of South Korea and the Ministry of Labor of Taiwan. For Taiwan, the regional distribution of labor union members is tracked by each local government. Sectoral value-added and employment in each region are used in measuring productivity, which varies across both sectors and regions, where productivity is defined by the real value-added per worker. Both countries' official national accounts and sectoral surveys are primary sources of my data on value-added and employment. As Taiwan's official statistics are not available on an annual basis, I interpolate annual variation using the Economic Transformation Database (De Vries et al. (2021)) constructed by the

University of Groningen. My cross-country evidence from 31 countries is estimated using the 10-sector Database (Timmer et al. (2015)) from the University of Groningen. Cross-country labor union density is from the database of the Organisation for Economic Co-operation and Development (OECD), International Labour Organization (ILO), and Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts (ICTWSS).

Using my geographically disaggregated sectoral data from two new democracies of East Asia, I test two key hypotheses. The first hypothesis I test is that South Korea and Taiwan went through growth-enhancing structural change. McMillan and Rodrik (2011) and Rodrik et al. (2017) have presented some stylized facts on country-specific experiences related to growth-enhancing and growth-reducing structural change. However, while they provided an overall conceptual framework and presented aggregated trends using cross-country data, they did not fully explore the dynamic nature of structural change and path dependence. Therefore, in order to study structural change in greater detail, I use geographically disaggregated sectoral data and use dynamic panel data estimation techniques in testing my first key hypothesis. The second key hypothesis is that the degree of unionization explains the heterogeneous magnitude by slowing down the speed of structural change. This is a novel contribution of the paper. To be specific, using dynamic panel data estimators, I find that the magnitude of growth-enhancing structural change varies negatively with the degree of unionization.

I find that both South Korea and Taiwan experienced growth-enhancing structural change during the sample period. In other words, a sector with higher productivity attracted more labor share. This confirmation of my first hypothesis is consistent with one of the findings about the economic growth of South Korea and Taiwan of Rodrik et al. (2017). Efficient re-allocation of labor allowed South Korea and Taiwan to sustain the rapid economic growth until recently. However, the size of growth-enhancing structural change was smaller for sectors with higher unionization. In other words, the increase in the employment share driven by a sector's productivity premium became smaller if the sector had to encounter

higher bargaining power of labor. Higher labor rigidity caused by the stronger bargaining power of labor decelerated the growth-enhancing structural change in South Korea and Taiwan. In addition, this heterogeneous size of growth-enhancing structural change became more pronounced after the legalization of the democratic confederation of labor unions in each of these two countries. This confirmation of my second hypothesis emphasizes the importance of the institutional characteristics of the labor market in determining the speed and magnitude of productive re-allocation of labor. I show that empirical findings from South Korea and Taiwan have considerable external validity through similar results from cross-country data.

One of the main implications of the above findings is that, after the fundamental regime change in the bargaining power of labor through democratization, the two countries no longer enjoyed rapid labor re-allocation based on productivity. Given the fact that their authoritarian regimes tried to maintain high labor market flexibility, my findings suggest that this flexibility is a critical determinant of rapid economic growth. In addition, because labor re-allocation driven by a sector's productivity premium became slower after democratization, within-sector growth rather than structural growth became the main drivers of growth. This transition to the more significant share of within-sector growth is supported by my productivity change decomposition using the South Korean sample.

The paper is organized as follows. In the next section, I discuss the related literature. I clarify the relationship between unionization and labor rigidity because it provides vital mechanisms in interpreting my empirical findings. I introduce some background on labor unions and labor movements in South Korea and Taiwan. I focus on how labor unions evolved along with the democratic transition in these two countries. Subsequent sections introduce my data and econometric specification, respectively. Then I interpret my estimation results and robustness checks. I conclude after I discuss extensions to my analysis of labor productivity change decomposition.

2 Related Literature

This section links this paper to the existing related research. As the title of this paper implies, I can categorize related literature into several topics. The growth experience of South Korea and Taiwan has been receiving steady focus from social scientists. As the onset of growth was settled mainly by their authoritarian regimes, the political economy approach has linked industrial policies of these two countries with the incentive of political agents. Along with this literature that focuses on country-specific cases, there are also cross-country studies on the impacts of institutional evolution on economic growth. The conceptual framework for comprehensive analysis on structural change and growth within an economy started getting exclusive focus in recent years when sector-level national accounts became widely available. The consequent accumulation of cross-country and within-country evidence is broadening our understanding of structural change and related issues in economic growth. As theoretical predictions and empirical studies about the impact of unionization on the labor market provide key guidance to my empirical analysis, I have an independent section (section 3) on them.

The concept of the 'development state' has been widely used in explaining the economic success of the two East Asian countries, South Korea and Taiwan, during the late 20th century. A development state is a regime that could sacrifice many other the citizens may value to guarantee economic growth. Political freedom or civil society used to be sacrificed for economic development. In addition, sacrificing a specific sector in terms of resource allocation also happened in order to boost another targeted sector. Manufacturing sectors enjoyed abundant resources, including both labor and capital, because the key element of their growth strategy was export promotion (Wade (1990) and Haggard (1990)). It was widely understood that the manufacturing sectors got the most attention from authoritarian politicians in both countries. Thanks to rapid economic growth coming from the successful implementation of this development strategy, authoritarian politicians were able to find support for their rule for decades. Amsden (1989) and Woo and Woo-Cummings (1991) elaborated more on the

experience of South Korea. Woo and Woo-Cummings (1991) revisited the role of financial interventions made by the Korean government that allowed manufacturing sectors to get a stable capital allocation. Wade (1990) provided a Taiwan-specific understanding which focused on the synergy between public administration and the market.[1]

In addition to the above political economy approaches, macroeconomists also contributed in understanding these two countries in East Asia. Lucas (1988, 1993) emphasized the importance of human capital accumulation through learning by doing. The channel of learning by doing in both countries was highly correlated with their industrial policies. In the beginning of their industrialization, if it were not for the government's intervention, the manufacturing sector was not able to attract enough economic factors of production. Both countries lacked a foundation for manufacturing after their independence. Therefore, the considerable reliance on the agricultural sector was the underlying feature until they started industrialization. Even though it was evident that the two countries' comparative advantages did not lie in the manufacturing sector, governments decided to specialize in manufacturing to attain comparative advantage in manufacturing within a few decades. Even though workers in the manufacturing sector were not productive enough initially, learning by doing, which became feasible due to government intervention, made them improve their productivity. In the end, by the early 1980s, they finally arrived at attaining comparative advantage in heavy manufacturing industries within the world economy.

The overall relationship between institutions and economic outcomes has been widely studied in both theoretical and empirical work. Among them, the role of democracy (or democratization) on economic outcomes became a subject of empirical investigation with the methodological advances in longitudinal panel data analysis. Barro (1996, 1997), and Tavares and Wacziarg (2001) pointed out the possible negative relationship between democ-

[1]Even though it is hard to classify Japanese governments during their rapid economic growth as authoritarian regimes, Japan's experience is also in a similar line with the experience of its neighbors. Johnson (1982) suggests that Japanese economic growth can be largely explained by Japan's efficient utilization of the Ministry of International Trade and Industry (MITI). MITI yielded strong influence on the financial sector to mandate resource allocation according to their industrial policy.

racy and economic growth. This negative relationship echoes around the experience of South Korea and Taiwan because their rapid growth is mostly attained during authoritarian regimes. Furthermore, we have been witnessing the rapid economic growth of China under its authoritarian rule. Recent empirical findings are more supporting findings for the positive relationship between democracy and economic development. Preworski and Limongi (1997), Rodrik and Wacziarg (2005), Persson and Tabellini (2007), Papaioannou and Siourounis (2008), and Acemoglu et al. (2019) focused on economic growth as the left-hand-side variable. They all found a positive relationship between the two, providing support for Lipset (1960)'s modernization theory. Acemoglu et al. (2019) found a causal relationship through causal inference after estimating dynamic panel model.

However, these findings in the previous paragraph should be understood as an overall static pattern across different continents and different periods, which can be different from the country-specific dynamic trend. The concept of democratization and democracy in existing cross-country panel data findings does not successfully apply to the dynamics of democracy. In new democracies, even though democratization is attained, it takes several decades or more for democracy to be consolidated. For example, in the case of labor representation which this paper focuses on, the legalization of the democratic labor union confederation was attained 12 years after democratization in South Korea and 9 years after the democratization in Taiwan. In line with this, Samuel Huntington's democratic consolidation criteria point out the second power shift as the critical point of democratic consolidation because new democracies gradually make progress towards well-functioning democracies over several decades.[2] Therefore, when and how the democratic political process is consolidated after democratization deserve enough consideration if an economist wants to have a detailed analysis of the impact of democratization. Some new democracies consolidate democratic institutions sooner than others while some others do not.[3] In addition, depending on the degree of consol-

[2]It is often called as the two turn-over test for democratic consolidation (Huntington (1991)). Preworski (1991) defined that a democratic system is consolidated when the democratic political process is considered as the unique, accessible process for taking political power.

[3]It is also true that we can see some reversals of new democracies towards the non-democratic regime.

idation, new democracies can have very different levels of freedom and transparency, varying across time. My paper incorporates this aspect by considering the dynamic process of structural change after democratization. Because the development of labor unions was one of the important aspects of the democratic consolidation in South Korea and Taiwan, identifying how the role of unionization changed after the legalization of the non-authoritarian union confederation will provide some implications which have not been discussed in detail yet.

The structural change I study in this paper comprises changes in employment shares across different sectors within an economy. The conceptual framework for my structural change analysis and its implication on economic growth are based on McMillan and Rodrik (2011), McMillan et al. (2014), and Rodrik et al. (2017). Structural change is considered growth-enhancing if the relative productivity of a sector is positively correlated with the change in its employment share. In other words, if a sector with higher productivity attracts greater employment share, then an economy has gone through growth-enhancing structural change. Symmetrically, structural change is growth-reducing if relative productivity of a sector is negatively correlated with the change in its employment share. Based on this definition, McMillan and Rodrik (2011) and Rodrik et al. (2017) classified structural change across countries: growth-enhancing structural change in Hong Kong, Thailand, and India and growth-reducing structural change in Argentina, Brazil, Nigeria, and Zambia. McMillan and Rodrik (2011) found that, in South Korea and Singapore, structural change was not growth-enhancing during 1990 - 2005. However, they suggested that the very rapid 'within' productivity growth was big enough to offset the negative role of structural change in making economic growth. My geographically decomposed analysis using the data on labor unionization suggests a possible mechanism. It will be discussed in detail in the section 9.

De Vries et al. (2015) applied this framework of structural change on the cross-country evidence of African nations. Ahsan and Mitra (2017) studied determinants of sectoral changes in employment shares across Indian states. McCaig and Pavcnik (2017) and Firpo and Pieri

Acemoglu et al. (2019)'s dichotomous democracy measure contains both democratization and its reversal.

(2017) discussed the overall trend in structural change and its growth implications in Vietnam and Brazil, respectively. Mueller et al. (2019) and Atta-Ankomah and Osei (2021) focused on the evidence from Ghana. As stylized facts on countries in different continents presented by McMillan and Rodrik (2011) and Rodrik et al. (2017) are based on highly aggregated information on limited information, detailed analysis with disaggregated panel data from South Korea and Taiwan will sharpen our understanding of structural change.

3 Unionization and Labor Rigidity

The labor movement in both countries went through drastic changes after democratization. Specifically, the legalization of autonomous and democratic labor union confederations after democratization fundamentally changed the labor movement and the power of labor unions. The next section will clarify and elaborate on the institutional backgrounds in the two new East Asian democracies that I am studying. Before diving into country-specific detail, I review the literature on channels linking unionization and labor market rigidity in this section. Unionization affects the wage level, employment, and wage dispersion. Changes in these labor market outcomes in turn can speed up or slow down structural change.

Theoretical predictions on the link between unionization and labor market rigidity have been made in some of the seminal works on collective bargaining by labor unions. Nickell and Andrews (1983) considered a labor union that represents all workers in the labor pool. The union maximizes expected utility of its members, and the firm maximizes its profits. Wage is determined through negotiation between the union and the firm. Both the union's and the firm's objective functions are functions of the negotiated wage. The bargaining power of labor unions affects the equilibrium level of wage and employment in the Nash bargaining solution. Nickell and Andrews (1983) derive a contract curve along which wage is an increasing function of the bargaining power of labor while the employment level decreases when the bargaining power increases. Because the wage is the only agenda in contract

bargaining between the labor union and the firm in Nickell and Andrews (1983), possible extensions to other contents in the contract can be considered more realistic.

McDonald and Solow (1981) derived a equilibrium where wage and employment are decided simultaneously. Booth (1995a) expanded discussions toward a broader contract, which includes wage and unemployment benefits. In both McDonald and Solow (1981) and Booth (1995a), the authors predicted that the wage would be increased whenever the bargaining power of labor is strengthened. However, the impacts on employment will be different from Nickell and Andrews (1983). McDonald and Solow (1981) clarified that the employment level increases when the bargaining power of unions increases, while Booth (1995a) expected that the employment level would not be affected by the bargaining power of labor unions.

The insider-outsider approach relaxes the assumption on labor unions' representation so that it can accommodate more realistic circumstances. As unemployed workers are usually excluded from the bargaining process, it assumes that the union only represents the utility of employed workers. Building upon this assumption, Lindbeck and Snower (1988) consider bargaining between union and firm. The bargaining occurs on a contract that includes the wage of union members (insiders) and the wage of future entrants (outsiders). Importantly, in the insider-outsider approach, the objective function of the wage of outsiders has almost no weight in the payoff of insiders and the objective function of their labor union. As the profit of the firm will be a negative function of future entrants' wages regardless of their weights in insiders' utility, negotiated wage level of future entrants will be set at the lowest possible level according to the Nash criterion.[4]

Among implications from the insider-outsider approach, I focus on the fact that the lower wage for future entrants implies increased rigidity of employment. First, outsiders who are

[4]Insider-outsider approach also accommodates the case when the median voter in a democratic union is a worker with relatively high seniority. The preference of senior workers is likely to be different from that of newly hired workers with less seniority, especially in terms of attitudes towards additional hiring. Newly hired workers can actually be regarded as outsiders when the union's median voter has considerable seniority. Therefore, the interests of newly hired workers will not be able to be reflected in the negotiated contract.

not employed in the firm when the negotiation occurs will not be attracted to join the firm at a low wage. Especially when an outsider candidate is a qualified candidate in terms of productivity, systematically lower wages for an outsider will push the candidate away from the firm instead of attracting the candidate. Also, insiders will want to remain in the current firm because they are clearly aware of the existence of their wage premiums and that they will encounter lower wages than current insiders in the alternative jobs in other firms. Consequently, labor re-allocation based on productivity differentials doesn't take place.

There is also empirical work on the effects of unionization of wage and employment. Many empirical studies found support for the wage premium of unionized workers predicted by the theoretical literature. Unionized workers enjoy a statistically significant wage premium in the United States, according to Lewis (1963, 1986), Card (1996), Hirsch (2004), and Sojourner et al. (2012). Booth (1995b) identified a union wage premium in the United Kingdom. Dell'Aringa and Lucifora (1994) and Lemieux (1998) found a positive impact of unionization on wages in Italy and Canada, respectively. Blanchflower and Freeman (1992) and Blanchflower and Bryson (2003) studied cross-country evidence on union wage premia. Blanchflower and Bryson (2003) found that the union wage premium is around 12 percent on average in 17 countries. Recent developments in the regression discontinuity approach allowed DiNardo and Lee (2004), Sojourner et al. (2012), Freandsen (2012) to quantify the causal impact of unionization. The finding here is that while narrowly elected labor unions do not always have a significant impact on wages, stronger unions with broader support have an explicit impact on wages.

Similar to the theoretical literature, empirical evidence on employment is mixed. The negative relationship between unionization and employment has been identified in Brown and Ashenfelter (1986), Card (1986, 1990), Abowd and Kramarz (1993), Kahn (2000), Sojourner et al. (2012), and Frandsen (2012). However, a positive relationship between unionization and employment level is found by Abowd (1989) and Maloney (1994). Nickell and Wadhwani (1990), Boal and Pencavel (1994), and DiNardo and Lee (2004) did not find any system-

atic relationship between unionization and employment level. Along with these findings on wage and employment levels, a notable pattern is, the variance in wages within a sector decreases when the sector has higher unionization. This is often interpreted as reduced wage inequality coming from unionization. Freeman and Medoff (1984), Blau and Kahn (1999), Frandsen (2012) all identified that unions compress the wage distribution in the United States. Rowthorn (1992), Blau and Kahn (1996), and Kahn (1998, 2000) found that wage inequalities are negatively correlated to the labor union density using cross-country data of OECD.

If I briefly summarize the above findings, both theoretical work and empirical studies show that more unionized workers earn higher wages. Empirical findings suggest that wage dispersion within a sector decreases with unionization. Contrary to the explicit prediction on wage, both theoretical and empirical research have not reached a consensus on whether more unionized firms will employ more or less workers. Explicit impacts on wages mean that when workers are more unionized, firms encounter a higher barrier in hiring more workers because of the existence of the union wage premium. In addition, firms no longer feel free to discriminate against workers by paying wages at different levels. Expansion in hiring coming from higher business profitability is less likely to happen when the bargaining power of labor unions increases with higher unionization.

In the next section, I discuss specifically labor unions in South Korea and Taiwan. By doing so, I convince why the increased bargaining power of labor unions after democratization can be interpreted as increased rigidity of labor in these two countries. Along with the two countries' institutional backgrounds, detailed descriptive statistics such as labor union density and labor-management dispute cases will be presented.

4 Democratization and Labor Union in South Korea and Taiwan

This section summarizes how the business-labor and government-labor relationships evolved as the democratic consolidation occurred in South Korea and Taiwan. These two countries went through democratization after they started rapid economic growth. The average annual economic growth rate in the 1970s in South Korea was 10.5 percent. During the same period, Taiwan's average annual economic growth rate was 18.7 percent. If we consider the first direct and democratic election for the presidency (or general elections in the parliamentary government system) as the critical point of democratization, South Korea was democratized in 1987, and Taiwan was democratized in 1996. But many researchers consider earlier years (mostly 1991 or 1994) as Taiwan's critical point of democratization. This is mainly because Taiwan's transition towards a democratic political system was relatively gradual compared to the case of South Korea. Even though it is still unclear whether the increased income level was the direct cause of democratic transition, the authoritarian regime became no longer sustainable in the 1980s in any of these two countries with accumulated wealth and human capital. Even though South Korea and Taiwan share similar periods for their economic growth and democratization, the actual process and properties of democratization are considerably different for these two countries. Moreover, the role of labor unions was also different for the two countries.[5]

The fight for labor rights and the labor movement were the key feature of the period of democratization and its consolidation in these two countries. Labor unions were under the direct control of the government during the authoritarian regimes in South Korea and Taiwan. There were many attempts to establish autonomous and non-authoritarian labor union confederations during the rule of dictators. However, it was not achieved until democratization. Even after democratization, the most prominent democratic and autonomous

[5]Among recent reviews on East Asian democratization, Yap (2011) and Slater and Wong (2013) provide comprehensive comparisons between the South Korean case and the Taiwanese case.

labor union confederations were not legalized during the early years of democratic governments. The legalization of those confederations was finally accomplished in 1999 in South Korea and 2000 in Taiwan, and these years are critical years for the liberalization of the labor movement in these two countries.

During the authoritarian regime, the labor movement in South Korea was much more militant and radical than in Taiwan. This is linked with the fact that the dictatorial regime of Taiwan was much more responsive and strategically sophisticated so that the ruling power could control and respond to the demands of citizens flexibly. Dictators in South Korea kept oppressive attitudes towards democratization camps and labor unions. The subsections below clarify details and elaborate the link between democratic transition and the labor union movement in the two East Asian new democracies.

4.1 Labor Union and its Development in South Korea

During the South Korean authoritarian period until 1987, there was only one representative and comprehensive federation of labor unions in the nation. Federation of Korean Trade Unions (FKTU) was the only labor union confederation that was legally identified by the South Korean authoritarian regime. Even though it served as the channel between employees and employers in Korea during that period, it is evidently true that the FKTU can be understood as a government-organized labor union confederation. Therefore, during this authoritarian period, the labor movements through FKTU were considerably far from those in fully democratized nations. It was natural for many activists and motivated workers to request an independent labor union confederation which is supposed to be free from the authoritarian regime's control. Even though the labor movement outside of the FKTU channel is regarded as illegal activity, efforts to establish an independent labor union confederation were broadly supported by many citizens and workers. These efforts are often called 'Democratic Union Movement', and it was finally institutionalized in 1988 after democratization

was achieved.[6]

The newly-organized democratic confederation of the labor union, the Korean Confederation of Trade Unions (KCTU), was first organized in 1988 as a representative confederation of democratic labor unions.[7] KCTU became the new center for radical and progressive labor movements even though it was not legally accepted when it was first organized. KCTU was recognized under the labor union law in 1999, and it gained equal status relative to FKTU. After democratization had been achieved, FKTU also went through considerable change and reforms in their movement and transparency. Even though it is still true that FKTU was not that radical compared to KCTU, it is clear that FKTU became democratic and independent when its counterpart, KCTU, was consolidated. In 2019, FKTU accounted for 40 percent of labor union members in South Korea, while KCTU had 41 percent of labor union members.

The legitimization of KCTU allowed the progressive labor movement in South Korea to be liberalized and protected by law since 1999. Official statistics on labor-management dispute cases reflect that the legalization had considerable impacts on workers' claims towards employers. The 3-year annual average of labor-management dispute cases right before the legalization of KCTU (1996 - 1998) is 97. However, the 3-year annual average of labor-management dispute cases right after the legalization (1999 - 2001) is 227. Employees had to take the risk of joining illegal confederations for progressive movements before the legalization. Incorporating KCTU in the legal system removed the risk, and employees began actively pursuing basic and fundamental rights as workers in 1999.

4.2 Labor Union and its Development in Taiwan

Similar to the case of South Korea, in Taiwan, only one umbrella confederation of labor unions monopolized legal status during the authoritarian regime. The Chinese Federation of Labor (CFL) served as the unique legitimate confederation which aggregates county-level

[6]South Korea joined the International Labour Organization (ILO) in 1991.

[7]It started from the different name (National Committee for Camps in Labor Union Movement) in 1988 and changed its name in 1990 (National Committee for Labor Union Movement). The current name, KCTU, became the official name in 1995, and it is used until current days.

(or city-level) federations of unions. Even though the CFL did not have a direct impact on industrial and occupational unions within a county-level federation of unions (Huang (2002)), regional federations had very close ties to the ruling party (Kuo Min Tang, KMT) during the authoritarian regime.[8] Therefore, the formation and legalization of a new labor union confederation at the national level was the main goal of labor movement activists during this period. One of the main strategies of this 'new labor confederation movement' which turned out to be efficient in Taiwan, was having a close connection with politicians of the opposition party (Democratic Progressive Party (DPP)). This enabled them to be active in regions where DPP had broader support than KMT. And also, this made the main politicians of DPP, such as Shui-bian Chen, promise the legalization of a newly independent and legal labor union confederation. Shui-bian Chen finally became the winner of the presidential election after the democratization in 2000 and implemented the new trade union law in 2000.

Following the new trade union law, since 2000, there have been three labor union umbrella confederations. Along with CFL, there are the Taiwan Confederation of Trade Unions (TCTU) and the National Federation of Labor (NFL). TCTU was established in 1999, and it explicitly opposed the former trade union law. Compared to CFL's close tie to the former authoritarian party KMT, TCTU has a close tie to DPP. This autonomous and independent confederation which was free from KMT rule was recognized by the new trade union law in 2000. The NFL was also established in 2000. CFL's pro-KMT activists left CFL after they lost power in CFL and then organized NFL. Based on these dynamics and the evolution of Taiwanese labor confederations, we can say that Taiwanese labor unions after 2000 were a lot more powerful than those before 2000. The 3-year annual average of labor-management dispute cases right before the legalization of TCTU (1997 - 1999) was 4214. However, the 3-year annual average of labor-management dispute cases right after the legalization (2000 - 2002) was 10999. The labor movement has become more active and liberal since 2000 with

[8]Elected union officials usually belonged to occupational unions whose leaders tended to be members of (or have close ties with) the KMT. See Huang (2002) for more details.

the legalization of TCTU.

4.3 Variation in the Unionization

Even though Taiwan was able to achieve democratization a little bit later than South Korea, the two countries share almost the same year (1999 for South Korea and 2000 for Taiwan) as the starting point of labor union liberalization. Since the rapid economic growth of the two countries, Taiwan has had a considerably higher union density rate than South Korea. For example, in 1990, which is near the starting point of my sample for baseline analysis, South Korea's overall labor union density[9] rate was 17.4 percent while that of Taiwan was 43.3 percent. In 2000 and 2015, South Korean density rates were 11.4 percent and 10 percent, respectively, which are still similar to ratio in 1990. South Korean labor union density steeply increased right after the democratization in 1987, but it decreased again during the economic reform following its economic crisis in 1997. On the other hand, the Taiwanese overall labor union density rate in 2000 was 38.5 percent, and it was 33.4 in 2015. Even though Taiwan's labor union density also fell considerably after 1990, the gap between those two countries remained relatively constant until recent years.

Even though the density rate may indicate that Taiwan has been managing more motivated and active labor unions compared to South Korea, we cannot directly compare the labor union densities in these two countries. Even with Taiwan's higher aggregate labor union density rate, it is well known that the labor union movements in South Korea have been better organized compared to those in Taiwan. Since the early 1980s, the Taiwanese government significantly relaxed the process of licensing newly established occupational unions. In addition, many Taiwanese citizens, working or not, joined an occupational union to acquire health insurance because unions acted as the main platform for health insurance. This is the main reason for my separate estimations for the Korean and Taiwanese samples.

However, within a nation, labor union density does represent heterogeneity in unioniza-

[9]The total number of union members divided by the total number of employees.

tion. There are two sources of heterogeneous unionization in South Korea and Taiwan. First, spatial heterogeneity exists across different provinces and regions in both countries. In South Korea, labor movements have close ties to left-wing political parties. Regions with broader support for left-wing parties exhibit systematically higher participation in labor unions. Given the fact that South Korea has strong regionalism in politics, labor unions in left-dominant regions built their organizational foundation during multiple decades. Similarly, in Taiwan, regions with more left-wing support had higher participation in labor movements and consequent higher union density. Southern regions centered by the Kaohsiung area started to be the hub of left-wing activities since the late 1970s. It was natural for activists to gather together in the southern area and work together under the goal of the democratic labor union confederation. The southern area's broader support for the anti-authoritarian party, DPP, helped the labor movement thrive in the region relative to other parts of the nation. Second, there is sectoral heterogeneity within each country. Especially in the formation of labor unions, some sectors have more favorable conditions than others. Sectors whose workers work together within an indoor workplace, such as the manufacturing sector, are likely to have faster and broader formation of unions. As both countries experienced a rapid expansion of the economy through their giant manufacturing firms, manufacturing sectors led the movement towards unionization. This is in stark contrast to agriculture and service sectors. I believe that my unionization index successfully captures the heterogeneity across provinces and sectors.

5 Data

This section describes data sources and variables that I use in my empirical analysis. The first subsection describes how I construct my index of unionization, which varies across different regions and sectors. The second subsection includes information on the spatial and sectoral distribution of workers. Value-added for deriving productivity is also handled in the second

subsection. The third subsection discusses descriptive statistics.

5.1 Degree of Unionization

Yearly reports from South Korea's Ministry of Employment and Labor contain the geographical distribution of labor union members. In the case of Taiwan, local governments and Ministry of Labor provide information on unions and number of members, so I am able to construct the geographical distribution of union members.

Using the above publicly available information, I construct my measure of unionization, $Unionize_{ijt}$, for each sector i in the region j in year t, given by

$$Unionize_{ijt} = \left\{ \frac{L^u_{jt}}{L^u_t} \times L^u_{it} \right\} \Big/ L_{ijt} \tag{1}$$

where L^u denotes the number of members of labor unions. L^u_{jt}/L^u_t quantifies region j's share of labor union members in the total for the country in year t. L^u_{it} is the sectoral number of labor union members. It is aggregated based on the number of members in industrial labor union confederations of South Korea and Taiwan. Industrial labor union confederations are umbrella confederations at the industry level. By multiplying L^u_{jt}/L^u_t by L^u_{it}, $Unionize_{ijt}$ multiplies both sector-level variation and geographical variation in the degree of unionization. Dividing by L_{ijt}, the total number of employees in each sector of the region, leads us to get $Unionize_{ijt}$ which is a normalized proxy for the degree of unionization.

Note that in $Unionize_{ijt}$, the aggregate sector-level union members (L^u_{it}) are distributed according to the region j's share of all labor union members (L^u_{jt}/L^u_t). Unfortunately, in constructing $Unionize_{ijt}$, due to data constraints, I am unable to take region j's industrial structure into account. Note that my unionization measure for sector i in region j is not the actual unionization, but it is a proxy.[10] I also have robustness checks with reasonable alternative measures of unionization. Those alternative measures for the degree of unionization

[10]Under the assumption of $(L^u_{jt}/L^u_t) = (L^u_{ijt}/L^u_{it})$, equation (1) will be exactly equal to the actual labor union density (L^u_{ijt}/L_{ijt}). In practice, this equality often may not hold.

are discussed in section 8.

In Table 1, I list the 10 sectors of the classification I use for my cross-country work. However, regional value-added information from South Korea is for 7 sectors, listed in Table 2. Similarly, the Taiwanese data for the first 12 years are for 9 sectors, while for later years since 2004, information is available for all 10 sectors. $Unionize_{ijt}$ can be constructed for provinces in Korea[11] onwards 1980 while 1992 onwards for Taiwan.[12]

5.2 Value-added and Employment

For my value-added computation, I use annual data on real value-added and annual number of employees at the sector-region (province) level for 7 sectors in 17 regions in South Korea from 1989 to 2019. These data are available from Statistics Korea's Korean Statistical Information Service (KOSIS). The sectoral classification of these data is presented in Tables 1 and 2.

National Statistics of the Republic of China provides two census data for sectors in Taiwan. Industry and Service Census (ISC) includes non-agricultural sectors' 5-yearly data on sector-region (province) value-added and employment. Agriculture, Forestry, Fishery and Animal Husbandry Census (AFFAC) contains 5-yearly data of agricultural sector in every region. Proper interpolation with yearly variation is required to obtain annual panel data. The Economic Transformation Database published by the University of Groningen provides the yearly national levels of sectoral real value-added and employment. In my interpolated data, the sector-region shares of value-added and employment in ISC and AFFAC are multiplied with national yearly levels in Economic Transformation Database. Even though shares from ISC and AFFAC vary every 5-year, consequent interpolated real value-added and em-

[11]The 17 South Korean regions used in my estimations are Seoul, Taejeon, Taegu, Busan, Gwangju, Incheon, Ulsan, Kyeonggi, Kangwon, Chungbuk, Chungnam, Sejong, Jeonbuk, Jeonnam, Kyeongbuk, Kyeongnam, and Jeju. These regions form an unbalanced panel.

[12]The 25 Taiwanese regions used in my estimations are Changhua county, Chiayi city, Chiayi county, Hsinchu country, Hualien county, Kaohsiung city, Kaohsiung county, Keelung city, Miaoli county, Nantou county, New Taipei city (Taipei county), Penghu county, Pingtung county, Taichung city, Taichung county, Tainan city, Tainan county, Taipei city, Taitung county, Taoyuan city, Yilan county, Yunlin county, Kinmen county, and Lienchiang county. Like in the South Korean case, here again we have an unbalanced panel.

ployment vary every year thanks to the annual variation in the Economic Transformation Database. Tables 1 and 2 clarifies sectoral classification of Taiwanese sample.

Based on the above data for value-added and employment, I can get employment share and relative productivity which are key variables for my estimations. I define them in the next subsection.

5.3 Descriptive Statistics

Descriptive statistics are presented in Table 3. Observations in Table 3 are restricted to those used in my baseline estimation. This sample spans 1989 - 2019 for South Korea and 1992 - 2018 for Taiwan. The sample average of $Unionize_{ijt}$ is 7.9 percent for South Korea and 44.4 for Taiwan. According to the International Labour Organization (ILO), the average labor union density for South Korea during 2000 - 2015 was 10.36 percent and 39.78 percent for Taiwan during 2004 - 2010. Thus my measure $Unionize_{ijt}$ seems to do a good job in measuring unionization in both countries I am studying.

Since my assumption $(L^u_{jt}/L^u_t) = (L^u_{ijt}/L^u_{it})$ may not often hold, it is possible that at time $Unionize_{ijt}$ exceeds 1. In the South Korean sample, in less than 1 percent of observations, $Unionize_{ijt}$ exceeds 1. On the other hand, for the Taiwanese sample, it is around 11 percent. This stems from the fact that Taiwan has systematically higher union density due to the link with health insurance.

The variation in $Unionize_{ijt}$ within each nation reflects variations in geography and politics across regions within that nation (see section 4). Gwangju has been the center of left-wing activities with continuous and steady support from citizens and voters. In 1996, for example, Gwangju's manufacturing sector's $Unionize_{ijt}$ was 0.21. However, it was 0.10 for Seoul and 0.08 for Taegu. Sectoral heterogeneity is also considerable. $Unionize_{ijt}$ for trade services sector (WRT in Table 1 and Table 2) in Gwangju was 0.003, while it was 0.06 for government or personal services sector (PUBO in Table 1 and Table 2) there the same year. These are much lower than the manufacturing sector's value (0.21). Similar patterns are

observed across other sectors and other regions in South Korea. Likewise, $Unionize_{ijt}$ reflects geographical and sectoral variation within Taiwan. Kaohsiung county has a systematically higher value of $Unionize_{ijt}$ compared to other regions. The manufacturing sector in Taiwan also tends to have a higher degree of unionization measured by $Unionize_{ijt}$ compared to other sectors such as the trade services sector (WRT).

I denote θ_{ijt} by the employment share of sector i in region j in year t ($\theta_{ijt} = L_{ijt}/L_{jt}$). The consequent first-difference ($\theta_{ijt} - \theta_{ijt-1}$) is denoted as $\Delta\theta_{ijt}$. p_{ijt} is the annual productivity measure of each sector-region pair ij. I measure $p_{ijt} = V_{ijt}/L_{ijt}$ where V_{ijt} stands for the real value-added. V_{ijt} is represented by local currency unit in millions.[13] L_{ijt} is the total number of employees in each sector-region pair. I construct relative productivity (p_{ijt}/P_{jt}) which is relative to the overall productivity of region j, $P_{jt} = V_{jt}/L_{jt}$. For both South Korea in Taiwan, the sample average of p_{ijt}/P_{jt} is slightly larger than 1 (Table 3).[14]

6 Econometric Specification

Based on the institutional backgrounds of the democratic consolidation and unionization of two countries, I present a dynamic panel data model which can test some key hypotheses. Two of them are the main interests of this paper. First, based on the conceptual framework in Rodrik et al. (2017), I test whether structural changes in South Korea and Taiwan were growth-enhancing or growth-reducing. If the relative productivity has a positive effect on the change in employment share, we can say that we can observe growth-enhancing structural change. On the other hand, if the effect is negative, it can be interpreted as the growth-reducing structural change. The second hypothesis, which has political-economy implications, is about the role of unionization in explaining structural change. Unionization can change the direction of structural change or it can reduce its speed. The interaction term between relative productivity and the unionization index allows me to test whether the

[13] Won in South Korea and Taiwan Dollar in Taiwan. Both are represented at constant 2015 prices.

[14] The relative productivity can have a negative value because measured value-added is sometimes negative.

unionization decelerates growth-enhancing structural change (or even changes its direction). Thus, I use following dynamic panel estimation equation.

$$\begin{aligned}\Delta\theta_{ijt} = \beta_0 + \sum_{a=1}^{d}\beta_{1a}\Delta\theta_{ijt-a} + \beta_2\frac{p_{ijt-b}}{P_{jt-b}} + \beta_3 Unionize_{ijt} \\ +\beta_4\frac{p_{ijt-b}}{P_{jt-b}}\times Unionize_{ijt} + \mu_{ij} + \lambda_t + \nu_{ijt}\end{aligned} \tag{2}$$

Individual heterogeneity across sector-region pair ij is captured by the fixed effect μ_{ij}. The time-specific effect is represented by λ_t while ν_{ijt} is the stochastic term.

The change in employment share in each sector i in region j, $\Delta\theta_{ijt}$, is explained by its lagged variables $\sum_{a=1}^{d}\beta_{1a}\Delta\theta_{ijt-a}$ in this framework. I sequentially add further lag of the dependent variable based on the validity of instrumental variables for GMM where $1{\leq}a{\leq}4$. The key test statistics for model specification will be the AR$(a+1)$ test so that I can make sure that Arellano and Bond (1991)'s instrumental variables for the endogeneity coming from $\sum_{a=1}^{d}\beta_{1a}\Delta\theta_{ijt-a}$ are valid instruments. If the AR$(a+1)$ test gives us satisfactory confidence on the validity of instruments, I use $\Delta\theta_{ijt-a-1}$ and its further lags as instrumental variables. The smaller order AR tests such as AR(1) should reject their null hypotheses in order to justify the dynamic panel specification. Because adding further lags as instrumental variables in Arellano and Bond (1991) allows us an over-identification test, I use Hansen-type robust test statistics.

By having a set of lagged dependent variables, I test the path dependence of structural change measured by the change in employment share. Also, unobserved determinants of $\Delta\theta_{ijt}$ will be able to be controlled for by both lagged dependent variables and fixed effects. By following the transformation suggested by Arellano and Bond (1991), the first-difference method handles the heterogeneities of each sector-region pair. For the South Korean sample, according to AR test statistics, the preferred value of d in equation (2) is 1 while it is $d = 4$ in the Taiwanese sample. As I discussed in the previous section, data on South Korea and Taiwan vary across years and ij pairs. However, in the case of Taiwan, the

multiplied geographical shares for industry-level distribution of value-added and employment vary across 5-year periods. Therefore, in estimating the Taiwanese sample, having $d = 4$ is the preferred level. By having $d = 4$, instrumental variables clearly satisfy the exogeneity requirement. This is also supported by AR test statistics. The fifth-year and further lags of the dependent variable are used as instrumental variables in my estimation for Taiwan. In case of South Korea, the second year lag and its further lags are utilized. Other types of dynamic panel estimators, including Anderson and Hsiao (1982)'s first-difference estimator, two-step GMM estimator, and system GMM estimator are used as robustness checks.

The relative productivity is added as a lagged variable in equation (2). This is mainly due to simultaneity associated with $\Delta\theta_{ijt}$ and p_{ijt}/P_{jt}. The current relative productivity might be affected by the contemporaneous change in employment share. In order to avoid issues related to simultaneity, I have lagged relative productivity on the right-hand-side where $3 \leq b \leq 5$. Because the first or second year lag ($b = 1$ or $b = 2$) will not be enough to guarantee exogeneity, I start from the third year lag of relative productivity. The current change in employment share in year t and the relative productivity in year $t-b$ when $3 \leq b \leq 5$ are unlikely to be simultaneously affected by common shocks.

Along with the linear term of the degree of unionization, the interaction between relative productivity and unionization is included on the right-hand-side in equation (2). Based on this specification, we can test whether the magnitude of growth-enhancing structural change in both countries can be explained by the degree of unionization. The marginal effect of relative productivity will determine the direction of structural change (growth-enhancing or growth-reducing). I use Delta Method to calculate partial derivatives and their standard errors and test the null hypothesis of a zero marginal effect. If the marginal effect of the relative productivity is positive ($\frac{\partial \Delta\theta_{ijt}}{\partial(p_{ijt}/P_{jt})} > 0$), then $\beta_4 > 0$ means that the degree of unionization accelerated the growth-enhancing structural change while $\beta_4 < 0$ indicates that the unionization decelerated the growth-enhancing structural change.[15] McMillan and Rodrik

[15]Symmetrically, when $\frac{\partial \Delta\theta_{ijt}}{\partial(p_{ijt}/P_{jt})} < 0$, $\beta_4 < 0$ means that unionization accelerated growth-reducing structural change. On the other hand, $\beta_4 > 0$ means that unionization decelerated growth-reducing structural

(2011) and Rodrik et al. (2017) uncovered country-specific stylized facts without incorporating dynamic aspects of structural change. They did not allow for the possible heterogeneity due to variations in labor rigidity. I provide a rigorous test for it using disaggregated dynamic estimation with the empirical partial derivative in terms of p_{ijt}/P_{jt}. As mentioned earlier, I further study the impact of labor market unionization on speeding up or delaying growth-enhancing structural change.

7 Estimation Results

This section presents the empirical evidence on how unionization links structural change to the variation in labor productivity. The main focus is on whether unionization explains the heterogeneous magnitudes of growth-enhancing structural change. As mentioned earlier, the gap in unionization density between the two countries does not reflect the actual organizational ability of the two countries' labor unions. Therefore, pooling the two countries in the same sample might lead to a misspecified model and a misinterpretation of the role of the labor union. In the following subsections, I sequentially cover South Korea and Taiwan and see whether they share any qualitative features or are different in terms of their structural change experience. Before I start presenting country-specific results, I describe cross-country patterns coming from a sample of 31 countries.

7.1 The Global Pattern

In this subsection, I present cross-country evidence from 31 countries[16] before I dive into the analysis on South Korea and Taiwan. The sample period is from 1964 to 2012. The cross-country evidence will clarify whether unionization can explain the heterogeneous cross-national magnitude and direction of structural change. Also, I will discuss the difference

change.

[16] Argentina, Brazil, Chile, China, Colombia, Costa Rica, Denmark, Spain, Ethiopia, France, UK, Ghana, Hong Kong, Indonesia, India, Italy, Japan, South Korea, Mexico, Mauritius, Malaysia, Netherlands, Peru, Philippines, Singapore, Sweden, Thailand, Taiwan, Tanzania, USA, South Africa

between democratic regimes and nondemocratic regimes in understanding the role of unionization across countries. For my South Korea and Taiwan estimations, I argue in favor of a sub-sample analysis using the year of legalization of the democratic labor union confederation to divide the sample.

Equation (3) below is an extension of equation (2) for my estimations using my cross-country sample. Subscript c which denotes country now replaces equation (2)'s subscript j for region.

$$\begin{aligned}\Delta\theta_{ict} = \beta_0 + \sum_{a=1}^{d}\beta_{1a}\Delta\theta_{ict-a} + \beta_2\frac{p_{ict-b}}{P_{ct-b}} + \beta_3 Unionize_{ct} \\ +\beta_4\frac{p_{ict-b}}{P_{ct-b}}\times Unionize_{ct} + \mu_{ic} + \lambda_t + \nu_{ict}\end{aligned} \tag{3}$$

The 10-sector decomposition of 31 countries comes from the 10-sector Database from Groningen University.[17] In this cross-country analysis of equation (3), I use $Unionize_{ct}$ instead of $Unionize_{ict}$. This means that the annual unionization level in equation (3) varies across country c only (not varies across industry i). The sector-specific unionization data is not easily accessible for longitudinal analysis in most countries. $Unionize_{ct}$ is the country-level union density measure[18] from OECD, ILO, and ICTWSS.[19] Using global data, we can see whether my main analysis for South Korea and Taiwan has external validity.

The sub-sampling is implemented based on the dichotomous dummy variable of Acemoglu et al. (2019). Their dichotomous dummy variable for democracy, D_{ct}, is equal to 1 if the country c can be classified as a democratic country in year t. Otherwise, $D_{ct} = 0$. In the first three columns of Table 4, equation (3) is estimated using the whole sample, then using the sub-sample with observations under democratic regimes, and finally the sub-sample of countries under non-democratic regimes. Column (4) estimates equation (3) by controlling D_{ct}. The list of countries reduces to 28 countries, and the sample period reduces to 1964 -

[17] Because the 10-sector Database provides the real value-added in local currency units, I use the exchange rate in order to convert to US dollars.

[18] $Unionize_{ct} = L^u_{ct}/L_{ct}$

[19] Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts

2010 when I utilize the democracy dummy variable of Acemolgu et al. (2019).[20] The reduced list of 28 counties still includes South Korea and Taiwan.

Table 4 includes estimation results when $b = 3$. This means that the third-year lag of relative productivity is used to avoid possible endogeneity or simultaneity. In column (1) of Table 4 we see that, with the overall sample, the role of unionization does not explain the heterogeneous magnitude of growth-enhancing structural change. Coefficients of Relative productivity, country-level union density, and their interaction term are not statistically significant. In the bottom panel of Table 4, empirical marginal effects of the relative productivity and $Unionize_{ct}$ at the sample mean of observations are shown. None of them reject the null hypotheses of zero marginal effect in column (1). One thing that we have to notice is that the path dependence represented by the lagged dependent variable shows statistical significance. The gain in employment share in year t is explained considerably by the gain in the previous year, $t-1$. Key test statistics, including AR and over-identification tests, support using Arellano and Bond (1991)'s dynamic estimation.

However, in column (2), when I restrict the sample only to democratic observations with $D_{ct} = 1$, consequent findings and implications are different. The marginal effect of relative productivity is positive and statistically significant in the 90-percent confidence interval. This means that a sector with higher productivity attracted greater employment share in countries under a democratic regime. The growth-enhancing structural change occurred during the sample period for these countries. The important point is that the interaction term between the relative productivity and $Unionize_{ct}$ exhibits a negative and significant estimated coefficient. This suggests that a sector in a country with higher unionization had a smaller growth-enhancing structural change. Even though democratic countries went through the growth-enhancing structural change during the sample period, the magnitude of growth-enhancing structural change is heterogeneous with respect to the degree of unionization. Increased unionization decelerated the speed of growth-enhancing structural change.

[20] Hong Kong, Tanzania, and South Africa are not considered in Acemolgu et al. (2019). And Acemoglu et al. (2019) did not cover years after 2010.

The lagged dependent variable is still a statistically significant determinant. AR and over-identification tests support the use of the GMM estimator. In columns (3) and (4), however, marginal effects of both relative productivity and $Unionize_{ct}$ are statistically insignificant. The interaction term between the relative productivity and $Unionize_{ct}$ is also not statistically significant in both columns. Test statistics in columns (3) and (4) indicate that the GMM estimation is properly executed.

Summarizing results in Table 4, unionization decelerates the growth-enhancing structural change only in democratic regimes, while this pattern cannot be identified in the non-democratic regime. As I reviewed in the section 3, increased unionization can be regarded as increased labor rigidity. The channel can be wage level, wage dispersion, and employment level. In democratic countries, a sector with higher unionization makes re-allocation based on the productivity differentials slower. This does not appear to be the case in non-democratic countries. Table 5 further adds $Left_{ct}$ as a control variable. $Left_{ct}$ is a dummy variable where $Left_{ct} = 1$ if the chief executive's party can be classified as left-wing party. $Left_{ct} = 0$ otherwise. It is constructed using data from the Database of Political Institutions[21] (DPI). If a country's overall policy orientation is progressive, controlling for its left orientation allows us to better identify the role of unionization. In Table 5 we see qualitatively the same results as in Table 4. Thus, even after incorporating the political orientation of a country, the result on the role of unionization remains robust.

Even though these findings using cross-country data are useful, there are some shortcomings. First, the current $Unionize_{ct}$ does not vary across sectors within a country. Second, pooling the union density variable from different countries for a single common estimation can be problematic because the difference between density ratio of a pair of country does not reflect the actual gap in unionization, as explained earlier. To overcome these issues, I use government reports on labor unions in South Korea and Taiwan to construct $Unionize_{ijt}$ which varies across different sectors and regions within a nation. Based on this $Unionize_{ijt}$,

[21] Cruz et al. (2021)

I then have separate estimations for each of the two new East Asian democracies, South Korea and Taiwan.

7.2 South Korea

Table 6 provides the estimation results for equation (2) using the whole South Korean sample. As I mentioned earlier, introducing a single lag of the dependent variable on the right-hand-side satisfies the AR restrictions. As p-values of AR(1) and AR(2) tests reveal, the instrumental variables of Arellano and Bond (1991), which start from the second-year lag of the dependent variable, are valid instrumental variables. Also, Hansen's over-identification test after the heteroskedasticity and autocorrelation robust estimation supports the validity of instruments in all three columns. As expected, there is path dependence of the change in employment share, $\Delta\theta_{ijt}$, with a large coefficient. In all three columns, the estimated coefficients of the lagged dependent variable are positive and statistically significant. This means that a sector in a region is likely to attract greater employment share increase in year t the greater was that increase in year $t-1$.

The first column of Table 6 uses relative productivity in year $t-3$, p_{ijt-3}/P_{jt-3}. And the second and the third columns use p_{ijt-4}/P_{jt-4} and p_{ijt-5}/P_{jt-5}, respectively. As the relative productivity is interacted with the index of the degree of unionization, the empirical marginal effect of relative productivity at the sample mean is supposed to be different from its estimated coefficient of the linear term. I use the Delta Method for this as well as for the marginal effect of $Unionize_{ijt}$.

The marginal effect of relative productivity is positive and statistically significant in all three columns in Table 6. Thus, there is growth-enhancing structural change in South Korea on average during the sample period. At the same time, we cannot reject the null hypothesis that the marginal effect of $Unionize_{ijt}$ is zero in any of the three columns in Table 6. Even though the overall marginal effect of $Unionize_{ijt}$ is statistically not different from zero, the coefficient of $Unionize_{ijt}$ does suggest something important in understanding structural

change. We can see that, in each column of Table 6, the interaction between $Unionize_{ijt}$ and lag of relative productivity has a negative coefficient. This means that, during the growth-enhancing structural change in South Korea, a sector in a region with a higher degree of unionization had smaller growth-enhancing structural change. This is consistent with the predictions of the literature on labor rigidities. As the greater unionization will lead to reduced flexibility in pulling in new workers, the speed of re-allocation will be slower than the optimal speed.

Based on the fact that the labor movement was liberalized by the legalization of the democratic labor union confederation in 1999 in South Korea, Table 7 analyzes sub-samples for before and after legalization. The left panel accounts for the period from 1989 and 1999 when KCTU was not recognized legally. The right panel of Table 7 covers years after 1999. In all six columns, Hansen's over-identification test supports the validity of the set of Arellano and Bond (1991)'s instrumental variables. The serial correlation tests of the first-differenced errors are satisfied throughout only except for the first column. We can see that the lagged dependent variable is only significant in the right panel of Table 7. In addition, the overall marginal effect of the relative productivity is positive and statistically significant in all three columns in the right panel of Table 7. In the left panel, even though the statistical significance is diminished compared to that of the right panel, we can still see the evidence of growth-enhancing structural change in the third column. The empirical partial derivative of $Unionize_{ijt}$ is not statistically significant in any of the columns.

The key difference between the left and right panels in Table 7 is in the estimated coefficients of the interaction term. In the left panel of Table 7, we can reject the null hypothesis that interaction term's coefficient is zero only in the third column. However, in the right panel, columns (5) and (6) have statistically significant results. This means that from 1989 to 1999, even though it is the period after democratization, the role of unionization is less visible than after the legitimization of KCTU, which happened in 1999. Growth-enhancing structural change had heterogeneous magnitude based on the unionization during 2000 - 2019,

while this pattern was less visible until 1999. Even in column (4), $\hat{\beta}_4$ is only marginally insignificant. Thus, the unionization's role is robust. However, in the left panel, which represents the period before the labor union liberalization, this is not the case.

7.3 Taiwan

I next estimate the same equations for a sample of Taiwanese sector-region pairs (Table 8) and then for sub-samples divided using the year of legalization of TCTU as the dividing line (Table 9).

Table 8 covers the whole Taiwanese sample from 1992, which is slightly after Taiwan's democratic transition. As explained earlier, correlation between interpolated years (where data are available on a 5-yearly basis) is controlled by adding four lagged dependent variables linearly on the right-hand-side of the equation (2). The serial correlation tests using the first-differenced errors of equation (2) support that the fifth-year lagged variable is a valid instrument. P-values for AR(5) tests are all bigger than critical values in all three columns, while lower-order AR tests reject the null hypothesis. Hansen's over-identification test after heteroskedasticity and autocorrelation robust estimation confirms that Arellano and Bond (1991)'s approach is valid for the Taiwanese data.

In each column of Table 8, every lagged dependent variable has a negative and statistically significant estimated coefficient. The greater is the change in employment share in past periods, the lower will be the change in the current period. We reject the null hypothesis that the overall marginal effect of relative productivity is zero only in the second column, where it is positive and statistically significant at the 10% level. We can see that the structural change in the Taiwanese economy also has been growth-enhancing. However, the statistical significance of this effect is lower here than in the case of South Korea. On the other hand, the overall marginal effect of $Unionize_{ijt}$ in all three columns is negative and statistically significant at the sample mean. A sector in a Taiwanese region with higher unionization is expected to have a smaller gain in employment share. Additionally, the

interaction between relative productivity and unionization has a negative and significant coefficients, providing evidence for the heterogeneity of growth-enhancing structural change. In columns (2) and (3), we can reject the null hypothesis that the coefficients of interaction terms are zero. Thus, in the Taiwanese case as well, higher unionization will lead to smaller growth-enhancing structural change.

The left panel in Table 9 covers years until 2000 (the year of legalization of TCTU), while the right panel is for the remaining years. Due to the small length of the time span for the left panel, I present results with a single lagged dependent variable. For the right panel, as the time span is longer, I maintain the specification from Table 8. In the left panel, serial correlation tests based on the first-difference errors support the validity of Arellano and Bond (1991)'s instrumental variables. However, the over-identification test results do not support the exogeneity of the instrumental variables used. The estimated coefficients of the interaction term are not statistically significant in the left panel, but are negative and significant throughout the right panel. AR tests and Hansen's robust over-identification tests in the right panel support the GMM approach taken. Thus the contraction of the growth-enhancing structural change with unionization is seen after the revision in Taiwan's labor union laws, which lead to the official recognition of the democratic confederation of labor union. This result is very similar to South Korea's.

8 Robustness Checks

8.1 Alternative Dynamic Estimators

A systematic bias, often called the Nickell bias (Nickell (1981)), arises if we do not address the endogeneity of the lagged dependent variable. Anderson and Hsiao (1981) suggested first-difference estimation to difference out the individual fixed effects. Both lagged level and lagged difference of endogenous variables have been used as exogenous instrumental variables under appropriate conditions. Arellano (1989) recommended the estimation using

instruments in levels due to its non-singularities and smaller variances.

I am using Arellano and Bond (1991)'s estimator as my main estimator in sections 6 and 7. Suggested results in previous sections with Arellano and Bond (1991)'s estimator are based on the one-step GMM estimation. The two-step GMM estimation can be derived by updating weight with the differenced residuals. Even though the one-step and two-step estimators are asymptotically equivalent when the error follows i.i.d. assumption, comparing this paper's main results with those from the two-step estimator will check the robustness of my estimation.

Along with Arellano and Bond (1991)'s GMM estimator, system GMM estimators have been widely used so that researchers can attain robust results under different assumptions. Arellano and Bover (1995) and Blundell and Bond (1998) showed that the Arellano and Bond (1991)'s lagged level as instrumental variables might be invalid instruments, especially when the dependent variable follows the random walk process. By using the lagged difference along with lagged level, Arellano and Bover (1995) and Blundell and Bond (1998) considered the system of equations so that they could get more efficient estimators. Ahn and Schmidt (1995)'s estimator further uses additional moment conditions which have not been handled in Arellano and Bond (1991). Under the usual settings of the linear dynamic panel data approach, Ahn and Schmidt (1995) suggested that there can be $T-2$ more moment conditions where T is the length of the panel data sample. These $T-2$ additional moment conditions are nonlinear moment conditions, and they allow researchers to make further efficiency gains.

Based on the above, I confirm the robustness of my findings using the alternative dynamic panel data estimators for the samples of both South Korea and Taiwan. With the Anderson and Hsiao (1982)'s first-difference estimator, the reduced number of exogenous variables compared to Arellano and Bond (1991) affects the significance level. However, the estimated signs of key variables remain robust. Two-step estimators of Arellano and Bond (1991) also keep my results qualitatively unchanged. When I use system GMM estimators, the statistical significance of the interaction term between relative productivity and unionization

index becomes more pronounced in both countries.

8.2 Robustness of $Unionize_{ijt}$

For reasons explained earlier, around 11-percent of observations in the Taiwanese sample have $Unionize_{ijt} > 1$ while it happens in less than 1 percent of observations in the South Korean sample. Estimating equation (2) by excluding observations with $Unionize_{ijt} > 1$ does not make any qualitative change in the South Korean sample, while the significance level is substantially affected for the Taiwanese sample, plausibly because a significant fraction of observations gets eliminated and the variation for identification is reduced.

I next construct alternative indices of the degree of unionization. Regardless of the precise form of the index, my key findings remain robust. The first alternative index is $Unionize^*_{ijt}$ below.

$$Unionize^*_{ijt} = \left\{ \frac{L_{jt}}{L_t} \times L^u_{it} \right\} \Big/ L_{ijt} \tag{4}$$

where all notations are consistent to those in previous sections. The difference between $Unionize_{ijt}$ and $Unionize^*_{ijt}$ is that the employment share of region j ($\frac{L_{jt}}{L_t}$) is used in constructing $Unionize^*_{ijt}$ instead of the union member share of region j ($\frac{L^u_{jt}}{L^u_t}$). $Unionize^*_{ijt}$ distributes sector-level industrial labor union members, L^u_{it}, according to the regional distribution of total employee while $Unionize_{ijt}$ distributes it according to the regional distribution of union members. Shifting $Unionize_{ijt}$ to $Unionize^*_{ijt}$ improves the tail of the distribution in the Taiwanese sample. Around 7-percent of Taiwanese observations have $Unionize^*_{ijt} > 1$ as opposed to 11-percent for $Unionize_{ijt} > 1$. The South Korean sample is virtually unaffected by this switch. Tables 10 and 11 present results with $Unionize^*_{ijt}$ in place of $Unionize_{ijt}$. Compared to tables derived by using $Unionize_{ijt}$, results are qualitatively unchanged for both South Korea and Taiwan in Tables 10 and 11.

Both $Unionize_{ijt}$ and $Unionize^*_{ijt}$ may have some potential sources of measurement error because it transforms sectoral distribution of union members (L^u_{it}) and regional distribution

of union members (L^u_{jt}) to get an index for the degree of unionization. Alternatively, I can use L^u_{it} and L^u_{jt} directly without any transformations, avoiding possible sources of measurement error as follows.

$$\begin{aligned}\Delta\theta_{ijt} = \beta_0 + \sum_{a=1}^{d}\beta_{1a}\Delta\theta_{ijt-a} + \beta_2\frac{p_{ijt-b}}{P_{jt-b}} + \beta_3\frac{L^u_{it}}{L_{it}} + \beta_4\frac{L^u_{jt}}{L_{jt}} \\ +\beta_5\frac{p_{ijt-b}}{P_{jt-b}}\times\frac{L^u_{it}}{L_{it}} + \beta_6\frac{p_{ijt-b}}{P_{jt-b}}\times\frac{L^u_{jt}}{L_{jt}} + \mu_{ij} + \lambda_t + \nu_{ijt}\end{aligned} \tag{5}$$

where $\frac{L^u_{it}}{L_{it}}$ is sectoral density and $\frac{L^u_{jt}}{L_{jt}}$ is regional density.[22]

Using equation (5), I provide counterparts for Table 6, 7, 8, and 9. Consequent replication of Table 6 is Table 12. All test statistics in Table 12 including the AR test and over-identification test, imply that the dynamic GMM estimation with instrumental variables suggested by Arellano and Bond (1991) can be properly implemented in columns (2) and (3). The marginal effect of relative productivity identifies that South Korea went through growth-enhancing structural change during the sample period. In line with Table 6, the magnitude of growth-enhancing structural change is heterogeneous across the degree of unionization. However, in Table 12, the degree of unionization is represented by two different measures, $\frac{L^u_{jt}}{L_{jt}}$ and $\frac{L^u_{it}}{L_{it}}$. The overall marginal effect of $\frac{L^u_{jt}}{L_{jt}}$ is not statistically significant while that of $\frac{L^u_{it}}{L_{it}}$ is positive and strongly significant. We can't reject the null hypothesis that the interaction with $\frac{L^u_{jt}}{L_{jt}}$ has a zero coefficient while the interaction with $\frac{L^u_{it}}{L_{it}}$ has negative and significant coefficients. This means that the heterogeneity of the magnitude of growth-enhancing structural change is mainly explained by sectoral unionization. The sub-sampling results following Table 7 also yield the same implications.

Next, I use the two measures ($\frac{L^u_{jt}}{L_{jt}}$ and $\frac{L^u_{it}}{L_{it}}$) for the Taiwanese sample. The deceleration of structural change caused by the unionization is not observed when equation (5) is estimated

[22] $\frac{L^u_{it}}{L_{it}}$ is between 0 and 1 in every observation of both countries. $\frac{L^u_{jt}}{L_{jt}}$ is also between 0 and 1 in both countries only except in the observations from Keelung city in Taiwan. Keelung city has $\frac{L^u_{jt}}{L_{jt}} > 1$ in nine years where its maximum is 1.17. Therefore, we can see that the concerns from extreme values are relieved considerably when we estimate equation (5).

with the whole sample. However, sub-sample analysis again finds the statistically significant role of unionization in Taiwan. In Table 13, in the left panel, which is for the period before the legalization of TCTU, the over-identification test does not support my GMM specification. Therefore, results in the left panel cannot be regarded as valid. However, all three columns in the right panel of the Table 13 satisfy AR conditions and over-identification tests. The regional unionization ($\frac{L^u_{jt}}{L_{jt}}$) explains the heterogeneous size of growth-enhancing structural change in column (4).

I further try the arithmetic mean of $\frac{L^u_{it}}{L_{it}}$ and $\frac{L^u_{jt}}{L_{jt}}$ to substitute $Unionize_{ijt}$. I also try geometric mean and the average of arithmetic mean and geometric mean. All three types of alternative $Unionize_{ijt}$ yield qualitatively same estimation results for South Korea and Taiwan. The statistical significance is maintained with robustness in South Korea while the it is weakened in Taiwan. However, the estimated signs and consequent implications are still robust in estimations for both countries.

9 Discussion

The main implication of this paper suggests that the increased bargaining power of labor attained by democratic consolidation decelerates growth-enhancing structural change. Based on this finding, it is very natural for economists to think about the next question: If the increased bargaining power of labor affected growth-enhancing structural change, did it also affect economic growth overall? The growth decomposition equation in McMillan and Rodrik (2011) and Rodrik et al. (2017) is given by

$$\Delta P_t = \sum_i^I \theta_{i,t-1} \Delta p_{i,t} + \sum_i^I p_{i,t} \Delta \theta_{i,t} \tag{6}$$

where notations are as defined earlier in this paper.[23] P_t and $p_{i,t}$ refer to economywide and sectoral labor productivity levels, respectively. The left-hand-side, ΔP_t measures the overall annual labor productivity change between two adjacent years. The total labor productivity change can be decomposed into two terms. The first term of the right-hand-side ($\sum_i^I \theta_{i,t-1}\Delta p_{i,t}$) is the within-sector component of labor productivity change (within component). The second term ($\sum_i^I p_{i,t}\Delta\theta_{i,t}$) is the structural change component of labor productivity change (structural component).

Figure 1 describes the decomposition results of the South Korean economy from 1965 to 2018. The bars show the shares of within component in total productivity change, while the line indicates those of structural component. It is evident that the share of structural component dominated the share of within component until the end of the 1980s. However, from the early 1990s, the share of within component started dominating the share of structural component during most of the years. Figure 2 clarifies it more explicitly by showing the difference between the two shares. The vertical axis of Figure 2 is the difference between the share of within component and the share of structural component. Three vertical lines indicate reference years: democratization, the first power shift,[24] and the second power shift.[25] Before democratization, the difference between the shares of within and structural components was often negative. The opposite has been the case after democratization. Furthermore, after the second power shift, which is the critical event for Huntington (1991)'s consolidation of democracy, within component dominates the structural component in all years, i.e., the difference in the shares of the two types of component is constantly positive. Figure 3 and Figure 4 are counterparts of Figure 1 and Figure 2 for the Taiwanese economy. The dominance of within component has been stable in Taiwan. Additionally, Figure 3 shows that, in recent years, the share of structural component has become considerably

[23] McMillan and Rodrik (2011) and Rodrik et al. (2017) considered decomposition with general year gap $(t-k)$ in measuring the sectoral change in employment share ($\theta_{i,t-k}$). This section focuses on the annual decomposition with $\theta_{i,t-1}$ in order to be able to link annual change in employment share with annual variation of unionization.

[24] 1997 presidential election (power shift from the right-wing to the left-wing.).

[25] 2007 presidential election (power shift from the left-wing to the right-wing.).

smaller relative to the pre-2000 period.

For each region j within each of the two countries, the decomposition equation will be $\Delta P_{jt} = \sum_i^I \theta_{ij,t-1}\Delta p_{ij,t} + \sum_i^I p_{ij,t}\Delta\theta_{ij,t}$ where i again denotes sector. I use the following estimation equation to investigate whether regional unionization ($\frac{L^u_{jt}}{L_{jt}}$) can explain the magnitude of structural component at the region level.

$$Struct_{jt} = \alpha_0 + \alpha_1 \frac{L^u_{jt-b}}{L_{jt-b}} + \mu_j + \lambda_t + \nu_{jt} \tag{7}$$

where $Struct_{jt}$ is the structural component ($\sum_i^I p_{ij,t}\Delta\theta_{ij,t}$) of regional productivity change decomposition. μ_j and λ_t represent the region-specific and year-specific effects, respectively. I address any possible endogeneity issue by sufficiently lagging the unionization variable ($4 \leq b \leq 6$). In addition, if we replace $Struct_{jt}$ with $Within_{jt}$ which stands for the within component term $\sum_i^I \theta_{ij,t-1}\Delta p_{ij,t}$, we have the following symmetric equation.

$$Within_{jt} = \alpha_0 + \alpha_1 \frac{L^u_{jt-b}}{L_{jt-b}} + \mu_j + \lambda_t + \nu_{jt} \tag{8}$$

Tables 14 and 15 present estimation results for South Korea and Taiwan, respectively. The three left columns of Table 14 and 15 are estimation results for equation (7), while the three right columns of them are those for equation (8). We can clearly see in Table 14 that regional lagged unionization is negatively associated with the magnitude of structural component in South Korea. However, the association between within component and regional unionization is positive. Table 15 shows us that there is no statistically significant relationship between any of the two components and regional unionization in Taiwan. McMillan and Rodrik (2011) used the labor rigidity index from World Development Indicators of World Bank to see its cross-country[26] relationship with the magnitude of structural component. They found a negative relationship between the labor rigidity index and the magnitude of structural component. My geographically decomposed sectoral analysis partially supports the finding

[26] 38 countries

of McMillan and Rodrik (2011). Results from South Korea in Table 14 are consistent with the aggregated pattern in McMillan and Rodrik (2011), while those in Table 15 show no such relationship.

McMillan and Rodrik (2011) indicated that, in South Korea and Singapore, the structural change was not growth-enhancing during 1990 - 2005. However, at the same time, they found that the very rapid 'within' productivity growth was big enough to offset the negative role of structural change in making economic growth. One of the background mechanisms can be identified in Table 14. The increase in unionization is related to the smaller magnitude of the structural component during my sample period. On the other hand, the increase in unionization is related to a bigger magnitude of within component. This relationship needs to be studied further in future research.

10 Conclusions

This paper finds that growth-enhancing structural change in South Korea and Taiwan exhibits heterogeneity and varies with unionization at the sector and region levels. Disaggregated data on 7 sectors in 17 regions in South Korea and 10 sectors in 25 regions in Taiwan during their democratic regimes are analyzed. In both countries, growth-enhancing structural change is observed throughout my sample period. The unionization-related heterogeneity in growth-enhancing structural change became much more explicit after the legalization of democratic labor confederations. Similar results are also obtained for a sample with 10 sectors of 31 countries. Only in democratic countries, a higher union density is related to a smaller growth-enhancing structural change, with no such pattern in non-democratic countries. This result is robust to controlling for the incumbency of the left-wing party.

Higher unionization can lead to higher labor-market rigidity through multiple channels, affecting wage levels, wage dispersion, and employment levels. Using various theories of unionization, I explain how the bargaining power of labor negatively affects the speed of

re-allocation of labor. As both South Korea and Taiwan experienced a considerable increase in the bargaining power of labor after democratization, the impact of unionization strongly shows up in my dynamic estimation.

It is important to note that there are positive effects of democratization that I have not studied in this paper. My focus is on the speed of structural change. However, I am not looking at other aspects of increased bargaining power of labor, such as the improvement in the welfare and safety of workers.

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Tables

Table 1: 10-Sector classification

Sectors	Sector Name	ISIC Rev. 3.1 Code	ISIC Rev. 3.1 Description
AGR	Agriculture	AtB	Agriculture, Hunting and Forestry, Fishing
MIN	Mining	C	Mining and Quarrying
MAN	Manufacturing	D	Manufacturing
WRT	Trade services	G+H	Wholesale and Retail trade; repair of motor vehicles, motorcycles and personal and household goods, Hotels and Restaurants
CON	Construction	F	Construction
PU	Utilities	E	Electricity, Gas, and Water Supply
TRA	Transport services	I	Transport, Storage and Communications
FIRE	Business services	J+K	Financial Intermediation, Renting and Business Activities (excluding owner occupied rents)
PUB	Government services	L, M, N	Public Administration and Defense, Education, Health and Social work
OTH	Personal services	O, P	Other Community, Social and Personal service activities, Activities of Private Households

Table 2: Sectors in South Korea and Taiwan

Sectors	Korea 1989 - 2019	Taiwan 1992 - 2003	Taiwan 2004 2012
AGR	AGR	AGR	AGR
MIN	MIN	MIN	MIN
MAN	MAN	MAN	MAN
WRT	WRT	WRT	WRT
CON	CON	CON	CON
PU	PTF	PU	PU
TRA		TRA	TRA
FIRE		FIRE	FIRE
PUB	PUBO	PUBO	PUB
OTH			OTH

Table 3: Descriptive statistics

Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
		South Korea			
θ_{ijt}	0.158	0.105	0	0.479	2640
$\Delta\theta_{ijt}$	3.44e-06	0.01	-0.047	0.055	2640
p_{ijt}/P_{jt}	1.233	1.167	0.042	11.636	2640
$unionize_{ijt}$	0.079	0.16	0	2.411	2640
		Taiwan			
θ_{ijt}	0.109	0.11	0	0.551	2865
$\Delta\theta_{ijt}$	-0.0002014	0.009	-0.086	0.103	2865
p_{ijt}/P_{jt}	1.049	1.001	-1.53	18.952	2865
$unionize_{ijt}$	0.444	1.129	0.001	19.915	2865

Table 4: Cross-country evidence using national union density.
31 countries, 1964 - 2012

	(1) $\Delta\theta_{ict}$	(2) $\Delta\theta_{ict}$	(3) $\Delta\theta_{ict}$	(4) $\Delta\theta_{ict}$
	All Sample	Samples of $D_{ct}=1$	Samples of $D_{ct}=0$	Control D_{ct}
$\Delta\theta_{ict-1}$	0.138**	0.205***	0.0826	0.161**
	(0.0658)	(0.0761)	(0.0583)	(0.0669)
p_{ict-3}/P_{ct-3}	-3.53e-08	0.0000947*	0.00000801	0.00000826
	(0.0000670)	(0.0000531)	(0.0000627)	(0.0000681)
$Unionize_{ct}$	-0.000118	0.000362**	-0.000137	-0.0000619
	(0.000302)	(0.000157)	(0.000316)	(0.000302)
$(p_{ict-3}/P_{ct-3})\times Unionize_{ct}$	0.0000492	-0.000123*	0.000103	0.0000346
	(0.000125)	(0.0000742)	(0.000209)	(0.000125)
D_{ct}				0.0000131*
				(0.00000759)
Observations	6688	5203	1166	6369
Fixed Effects	Yes	Yes	Yes	Yes
M.E of p/P	0.000015	0.000052*	0.000035	0.000019
(Delta Method)	(0.000030)	(0.000028)	(0.000069)	(0.00003)
M.E of $Unionize_{ct}$	-0.000017	0.000113	0.000094	9.29e-06
(Delta Method)	(0.000062)	(0.000074)	(0.000170)	(0.00006)
AR(1) p-value	0.000	0.000	0.001	0.000
AR(2) p-value	0.984	0.059	0.206	0.720
Hansen's oid p-value	1.000	1.000	1.000	1.000

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Cross-country evidence using national union density.
Economic policy orientation of the chief executive's political party as a control variable.

	(1) $\Delta\theta_{ict}$	(2) $\Delta\theta_{ict}$	(3) $\Delta\theta_{ict}$	(4) $\Delta\theta_{ict}$
	All Sample	Samples of $D_{ct}=1$	Samples of $D_{ct}=0$	Control D_{ct}
$\Delta\theta_{ict-1}$	0.294***	0.271***	0.199	0.294***
	(0.0783)	(0.0670)	(0.150)	(0.0783)
p_{ict-3}/P_{ct-3}	0.0000624	0.000101*	-0.0000676	0.0000624
	(0.0000568)	(0.0000525)	(0.000221)	(0.0000568)
$Unionize_{ct}$	0.000180	0.000297*	0.0000510	0.000173
	(0.000185)	(0.000169)	(0.000330)	(0.000187)
$(p_{ict-3}/P_{ct-3})\times Unionize_{ct}$	-0.0000858	-0.000140*	0.0000187	-0.0000857
	(0.0000887)	(0.0000746)	(0.000343)	(0.0000887)
$Left_{ct}$	-0.000000705	-0.00000147		-0.000000690
	(0.00000424)	(0.00000494)		(0.00000426)
D_{ct}				0.00000452
				(0.00000710)
Observations	4498	3995	503	4498
Fixed Effects	Yes	Yes	Yes	Yes
M.E of p/P	0.000033	0.000054*	-0.000060	0.000033
(Delta Method)	(0.000027)	(0.000027)	(0.000094)	(0.000027)
M.E of $Unionize_{ct}$	-2.79e-06	2.83e-07	0.000091	-9.60e-06
(Delta Method)	(0.000031)	(0.000068)	(0.000428)	(0.000029)
AR(1) p-value	0.000	0.000	0.019	0.000
AR(2) p-value	0.097	0.304	0.045	0.097
Hansen's oid p-value	1.000	1.000	1.000	1.000

Standard errors in parentheses

* $p<0.10$, ** $p<0.05$, *** $p<0.01$

Table 6: South Korea's 7 sectors in 17 regions. (1989 - 2019)
Arellano-Bond estimator using unbalanced panel.

	(1) $\Delta\theta_{ijt}$	(2) $\Delta\theta_{ijt}$	(3) $\Delta\theta_{ijt}$
$\Delta\theta_{ijt-1}$	0.112***	0.121***	0.121***
	(0.0237)	(0.0253)	(0.0276)
p_{ijt-3}/P_{jt-3}	0.00236***		
	(0.000747)		
p_{ijt-4}/P_{jt-4}		0.00166***	
		(0.000521)	
p_{ijt-5}/P_{jt-5}			0.00130***
			(0.000410)
$Unionize_{ijt}$	0.00229	0.00348*	0.00239
	(0.00159)	(0.00196)	(0.00159)
$(p_{ijt-3}/P_{jt-3})\times Unionize_{ijt}$	-0.00233***		
	(0.000813)		
$(p_{ijt-4}/P_{jt-4})\times Unionize_{ijt}$		-0.00214**	
		(0.000874)	
$(p_{ijt-5}/P_{jt-5})\times Unionize_{ijt}$			-0.00134***
			(0.000480)
Observations	2640	2528	2416
Fixed Effects	Yes	Yes	Yes
M.E of p/P	0.00217***	0.00149***	0.00119***
(Delta Method)	(0.00069)	(0.00047)	(0.00038)
M.E of $Unionize_{ijt}$	-0.00057	0.00083	0.00072
(Delta Method)	(0.00125)	(0.00143)	(0.00121)
AR(1) p-value	0.000	0.000	0.000
AR(2) p-value	0.189	0.646	0.913
Hansen's oid p-value	1.000	1.000	1.000

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: South Korea's 7 sectors in 17 regions. Before and after the legalization of KCTU. Arellano-Bond estimator using unbalanced panel.

	(1) $\Delta\theta_{ijt}$	(2) $\Delta\theta_{ijt}$	(3) $\Delta\theta_{ijt}$	(4) $\Delta\theta_{ijt}$	(5) $\Delta\theta_{ijt}$	(6) $\Delta\theta_{ijt}$
	1989 - 1999			2000 - 2019		
$\Delta\theta_{ijt-1}$	0.0483	0.0733	0.0615	0.0798**	0.0809**	0.0838**
	(0.0433)	(0.0522)	(0.0664)	(0.0324)	(0.0323)	(0.0330)
p_{ijt-3}/P_{jt-3}	0.00175			0.00198***		
	(0.00125)			(0.000686)		
p_{ijt-4}/P_{jt-4}		0.000815			0.00157***	
		(0.000628)			(0.000529)	
p_{ijt-5}/P_{jt-5}			0.00155*			0.00103***
			(0.000887)			(0.000378)
$Unionize_{ijt}$	-0.00119	0.00137	0.000887	0.00292	0.00269	0.00150
	(0.00286)	(0.00209)	(0.00181)	(0.00274)	(0.00220)	(0.00151)
$(p_{ijt-3}/P_{jt-3})\times Unionize_{ijt}$	-0.00145			-0.00254		
	(0.00114)			(0.00205)		
$(p_{ijt-4}/P_{jt-4})\times Unionize_{ijt}$		-0.00130			-0.00225*	
		(0.000889)			(0.00125)	
$(p_{ijt-5}/P_{jt-5})\times Unionize_{ijt}$			-0.00146*			-0.000987**
			(0.000848)			(0.000398)
Observations	682	580	481	1958	1948	1935
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
M.E of p/P	0.00157	0.00066	0.00138*	0.00181***	0.00142***	0.00096***
(Delta Method)	(0.00113)	(0.00055)	(0.00080)	(0.00065)	(0.00048)	(0.00035)
M.E of $Unionize_{ijt}$	-0.00309	-0.00031	-0.00098	-0.00011	-0.00005	0.00028
(Delta Method)	(0.00265)	(0.00194)	(0.00189)	(0.00157)	(0.00148)	(0.00126)
AR(1) p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR(2) p-value	0.015	0.161	0.606	0.651	0.733	0.790
Hansen's oid p-value	0.998	0.963	0.577	1.000	1.000	1.000

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Taiwan's 10 sectors in 25 regions. (1992 - 2018)
Arellano-Bond estimator using unbalanced panel.

	(1) $\Delta\theta_{ijt}$	(2) $\Delta\theta_{ijt}$	(3) $\Delta\theta_{ijt}$
$\Delta\theta_{ijt-1}$	-0.143***	-0.141***	-0.152***
	(0.0179)	(0.0173)	(0.0185)
$\Delta\theta_{ijt-2}$	-0.174***	-0.168***	-0.169***
	(0.0290)	(0.0287)	(0.0292)
$\Delta\theta_{ijt-3}$	-0.120***	-0.116***	-0.117***
	(0.0149)	(0.0151)	(0.0158)
$\Delta\theta_{ijt-4}$	-0.0783***	-0.0773***	-0.0753***
	(0.0126)	(0.0121)	(0.0156)
p_{ijt-3}/P_{jt-3}	0.000207		
	(0.000142)		
p_{ijt-4}/P_{jt-4}		0.000374**	
		(0.000171)	
p_{ijt-5}/P_{jt-5}			0.000317
			(0.000205)
$Unionize_{ijt}$	-0.000668**	-0.000553**	-0.000689**
	(0.000300)	(0.000254)	(0.000326)
$(p_{ijt-3}/P_{jt-3})\times Unionize_{ijt}$	-0.0000148		
	(0.000164)		
$(p_{ijt-4}/P_{jt-4})\times Unionize_{ijt}$		-0.000177**	
		(0.0000896)	
$(p_{ijt-5}/P_{jt-5})\times Unionize_{ijt}$			-0.000226*
			(0.000126)
Observations	2865	2850	2841
Fixed Effects	Yes	Yes	Yes
M.E of p/P	0.00020	0.00029*	0.00022
(Delta Method)	(0.00012)	(0.00015)	(0.00018)
M.E of $Unionize_{ijt}$	-0.00068***	-0.00075***	-0.00094***
(Delta Method)	(0.00022)	(0.00021)	(0.00023)
AR(1) p-value	0.000	0.000	0.000
AR(5) p-value	0.288	0.287	0.305
Hansen's oid p-value	1.000	1.000	1.000

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Taiwan's 10 sectors in 25 regions. Before and after the legalization of TCTU in 2000. Arellano-Bond estimator using unbalanced panel.

	(1) $\Delta\theta_{ijt}$	(2) $\Delta\theta_{ijt}$	(3) $\Delta\theta_{ijt}$	(4) $\Delta\theta_{ijt}$	(5) $\Delta\theta_{ijt}$	(6) $\Delta\theta_{ijt}$
	1992 - 2000			2001 - 2018		
$\Delta\theta_{ijt-1}$	-0.269***	-0.330***	-0.351***	-0.0903***	-0.0909***	-0.101***
	(0.0249)	(0.0267)	(0.0312)	(0.0157)	(0.0155)	(0.0170)
$\Delta\theta_{ijt-2}$				-0.101***	-0.101***	-0.110***
				(0.0119)	(0.0120)	(0.0139)
$\Delta\theta_{ijt-3}$				-0.0679***	-0.0680***	-0.0755***
				(0.0139)	(0.0146)	(0.0152)
$\Delta\theta_{ijt-4}$				-0.0138**	-0.0137**	-0.0597***
				(0.00582)	(0.00583)	(0.0166)
p_{ijt-3}/P_{jt-3}	0.00375*			0.000396***		
	(0.00227)			(0.000134)		
p_{ijt-4}/P_{jt-4}		0.00590			0.000433***	
		(0.00397)			(0.000152)	
p_{ijt-5}/P_{jt-5}			-0.00840**			0.000404**
			(0.00357)			(0.000197)
$Unionize_{ijt}$	-0.00240	-0.00245	-0.00397	-0.000199	-0.000194*	-0.000272**
	(0.00178)	(0.00178)	(0.00281)	(0.000128)	(0.000107)	(0.000131)
$(p_{ijt-3}/P_{jt-3})\times Unionize_{ijt}$	-0.000484			-0.000160**		
	(0.000869)			(0.0000656)		
$(p_{ijt-4}/P_{jt-4})\times Unionize_{ijt}$		-0.001000			-0.000207***	
		(0.00161)			(0.0000555)	
$(p_{ijt-5}/P_{jt-5})\times Unionize_{ijt}$			0.000714			-0.000253***
			(0.00152)			(0.0000941)
Observations	630	515	391	2548	2533	2522
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
M.E of p/P	0.00353	0.00541	-0.00799**	0.00032***	0.00034	0.00030
(Delta Method)	(0.00226)	(0.00397)	(0.00342)	(0.00012)	(0.00310)	(0.01028)
M.E of $Unionize_{ijt}$	-0.00304*	-0.00380	-0.00299	-0.00037***	-0.00042	-0.00055
(Delta Method)	(0.00166)	(0.00268)	(0.00322)	(0.00011)	(0.00201)	(0.00790)
AR(1) p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR(2) p-value	0.050	0.066	0.729			
AR(5) p-value				0.577	0.579	0.672
Hansen's oid p-value	0.001	0.000	0.000	1.000	1.000	0.000

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: South Korea's 7 sectors in 17 regions. Before and after the legalization of KCTU. Arellano-Bond estimator using unbalanced panel with $Unionize^{*}_{ijt}$.

	(1) $\Delta\theta_{ijt}$	(2) $\Delta\theta_{ijt}$	(3) $\Delta\theta_{ijt}$	(4) $\Delta\theta_{ijt}$	(5) $\Delta\theta_{ijt}$	(6) $\Delta\theta_{ijt}$
	1989 - 1999			2000 - 2019		
$\Delta\theta_{ijt-1}$	0.0460	0.0702	0.0502	0.0708**	0.0762**	0.0821**
	(0.0424)	(0.0521)	(0.0690)	(0.0324)	(0.0326)	(0.0331)
p_{ijt-3}/P_{jt-3}	0.00231			0.00321***		
	(0.00145)			(0.00118)		
p_{ijt-4}/P_{jt-4}		0.000857			0.00215***	
		(0.000725)			(0.000784)	
p_{ijt-5}/P_{jt-5}			0.00134			0.00111**
			(0.000902)			(0.000433)
$Unionize_{ijt^{*}}$	-0.00114	-0.00107	-0.00141	0.00819*	0.00521	-0.000837
	(0.00263)	(0.00242)	(0.00301)	(0.00475)	(0.00333)	(0.00274)
$(p_{ijt-3}/P_{jt-3})\times Unionize^{*}_{ijt}$	-0.00151			-0.00839**		
	(0.00107)			(0.00332)		
$(p_{ijt-4}/P_{jt-4})\times Unionize^{*}_{ijt}$		-0.000521			-0.00487**	
		(0.000750)			(0.00221)	
$(p_{ijt-5}/P_{jt-5})\times Unionize^{*}_{ijt}$			-0.000841			-0.00119*
			(0.000656)			(0.000715)
Observations	682	580	481	1958	1948	1935
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
M.E of p/P	0.00210	0.00078	0.00123	0.00248***	0.00172***	0.00100***
(Delta Method)	(0.00132)	(0.00064)	(0.00082)	(0.00091)	(0.00061)	(0.00038)
M.E of $Unionize^{*}_{ijt}$	-0.00311	-0.00174	-0.00248	-0.00187	-0.00073	-0.00230
(Delta Method)	(0.00297)	(0.00239)	(0.00283)	(0.00344)	(0.00297)	(0.00251)
AR(1) p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR(2) p-value	0.013	0.161	0.591	0.543	0.677	0.779
Hansen's oid p-value	0.998	0.941	0.439	1.000	1.000	1.000

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Taiwan's 10 sectors in 25 regions. Before and after the legalization of TCTU in 2000. Arellano-Bond estimator using unbalanced panel with $Unionize^*_{ijt}$.

	(1) $\Delta\theta_{ijt}$	(2) $\Delta\theta_{ijt}$	(3) $\Delta\theta_{ijt}$	(4) $\Delta\theta_{ijt}$	(5) $\Delta\theta_{ijt}$	(6) $\Delta\theta_{ijt}$
	1992 - 2000			2001 - 2018		
$\Delta\theta_{ijt-1}$	-0.285***	-0.366***	-0.278***	-0.0280**	-0.0266**	-0.0281**
	(0.0240)	(0.0308)	(0.0272)	(0.0125)	(0.0125)	(0.0127)
$\Delta\theta_{ijt-2}$				-0.0632***	-0.0621***	-0.0630***
				(0.0106)	(0.0107)	(0.0102)
$\Delta\theta_{ijt-3}$				-0.0356***	-0.0341***	-0.0326***
				(0.0109)	(0.0111)	(0.0114)
$\Delta\theta_{ijt-4}$				-0.0401***	-0.0409***	-0.0367***
				(0.00897)	(0.00891)	(0.0125)
p_{ijt-3}/P_{jt-3}	0.00242			0.000291**		
	(0.00163)			(0.000120)		
p_{ijt-4}/P_{jt-4}		0.00469			0.000237**	
		(0.00326)			(0.0000955)	
p_{ijt-5}/P_{jt-5}			-0.00636***			0.000138
			(0.00216)			(0.0000879)
$Unionize^*_{ijt}$	-0.00455***	-0.00382***	-0.00370***	-0.000204	-0.000283	-0.000419*
	(0.00142)	(0.00144)	(0.00139)	(0.000191)	(0.000176)	(0.000215)
$(p_{ijt-3}/P_{jt-3})\times Unionize^*_{ijt}$	0.000758			-0.000270***		
	(0.00149)			(0.0000785)		
$(p_{ijt-4}/P_{jt-4})\times Unionize^*_{ijt}$		-0.00132			-0.000311***	
		(0.00253)			(0.0000860)	
$(p_{ijt-5}/P_{jt-5})\times Unionize^*_{ijt}$			-0.000563			-0.000286***
			(0.00247)			(0.000106)
Observations	968	774	580	3180	3165	3156
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
M.E of p/P	0.00259*	0.00435	-0.00652***	0.00021**	0.00015*	0.00006
(Delta Method)	(0.00158)	(0.00314)	(0.00198)	(0.00010)	(0.00008)	(0.00006)
M.E of $Unionize^*_{ijt}$	-0.00350*	-0.00566*	-0.00448	-0.00051***	-0.00064***	-.00075***
(Delta Method)	(0.00186)	(0.00297)	(0.00286)	(0.00017)	(0.00018)	(0.00022)
AR(1) p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR(2) p-value	0.017	0.023	0.599			
AR(5) p-value				0.951	0.947	0.930
Hansen's oid p-value	0.000	0.000	0.000	1.000	1.000	1.000

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12: South Korea's 7 sectors in 17 regions. (1989 - 2019)
Arellano-Bond estimator using unbalanced panel with $\frac{L^u_{it}}{L_{it}}$ and $\frac{L^u_{jt}}{L_{jt}}$.

	(1) $\Delta\theta_{ijt}$	(2) $\Delta\theta_{ijt}$	(3) $\Delta\theta_{ijt}$
$\Delta\theta_{ijt-1}$	0.0378	0.0702**	0.0779***
	(0.0267)	(0.0285)	(0.0302)
p_{ijt-3}/P_{jt-3}	0.00506***		
	(0.00122)		
p_{ijt-4}/P_{jt-4}		0.00398***	
		(0.000934)	
p_{ijt-5}/P_{jt-5}			0.00317***
			(0.000852)
$\frac{L^u_{jt}}{L_{jt}}$	0.000678	0.000910	-0.00245
	(0.0111)	(0.0108)	(0.0104)
$\frac{L^u_{it}}{L_{it}}$	0.0349***	0.0367***	0.0366***
	(0.00957)	(0.00871)	(0.00944)
$(p_{ijt-3}/P_{jt-3})\times\frac{L^u_{jt}}{L_{jt}}$	0.00318		
	(0.00648)		
$(p_{ijt-3}/P_{jt-3})\times\frac{L^u_{it}}{L_{it}}$	-0.0130***		
	(0.00322)		
$(p_{ijt-4}/P_{jt-4})\times\frac{L^u_{jt}}{L_{jt}}$		0.00161	
		(0.00596)	
$(p_{ijt-4}/P_{jt-4})\times\frac{L^u_{it}}{L_{it}}$		-0.0111***	
		(0.00266)	
$(p_{ijt-5}/P_{jt-5})\times\frac{L^u_{jt}}{L_{jt}}$			0.00374
			(0.00522)
$(p_{ijt-5}/P_{jt-5})\times\frac{L^u_{it}}{L_{it}}$			-0.00965***
			(0.00252)
Observations	2406	2299	2192
Fixed Effects	Yes	Yes	Yes
M.E of p/P	0.00410***	0.00312***	0.00254***
(Delta Method)	(0.00093)	(0.00068)	(0.00062)
M.E of $\frac{L^u_{jt}}{L_{jt}}$	0.00461	0.00292	0.00225
(Delta Method)	(0.00745)	(0.00732)	(0.00725)
M.E of $\frac{L^u_{it}}{L_{it}}$	0.01882***	0.02282***	0.02442***
(Delta Method)	(0.00692)	(0.00649)	(0.00719)
AR(1) p-value	0.000	0.000	0.000
AR(2) p-value	0.024	0.380	0.463
Hansen's oid p-value	1.000	1.000	1.000

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 13: Taiwan's 10 sectors in 25 regions. Before and after the legalization of TCTU in 2000.
Arellano-Bond estimator using unbalanced panel with $\frac{L^u_{it}}{L_{it}}$ and $\frac{L^u_{jt}}{L_{jt}}$.

	(1) $\Delta\theta_{ijt}$	(2) $\Delta\theta_{ijt}$	(3) $\Delta\theta_{ijt}$	(4) $\Delta\theta_{ijt}$	(5) $\Delta\theta_{ijt}$	(6) $\Delta\theta_{ijt}$
	1992 - 2000			2001 - 2018		
$\Delta\theta_{ijt-1}$	-0.245***	-0.288***	-0.305***	-0.0782***	-0.0800***	-0.0813***
	(0.0256)	(0.0335)	(0.0293)	(0.0164)	(0.0163)	(0.0163)
$\Delta\theta_{ijt-2}$				-0.0910***	-0.0935***	-0.0940***
				(0.0126)	(0.0128)	(0.0127)
$\Delta\theta_{ijt-3}$				-0.0636***	-0.0683***	-0.0700***
				(0.0122)	(0.0133)	(0.0136)
$\Delta\theta_{ijt-4}$				-0.0597***	-0.0614***	-0.0628***
				(0.0109)	(0.0102)	(0.0107)
p_{ijt-3}/P_{jt-3}	0.00339			0.000850*		
	(0.00328)			(0.000453)		
p_{ijt-4}/P_{jt-4}		-0.00556			0.000840*	
		(0.00651)			(0.000464)	
p_{ijt-5}/P_{jt-5}			-0.00870			0.000544
			(0.00807)			(0.000440)
$\frac{L^u_{jt}}{L_{jt}}$	-0.0565	-0.0687	-0.0673	0.00128	0.00152	0.00208
	(0.0528)	(0.0573)	(0.0614)	(0.00488)	(0.00498)	(0.00541)
$\frac{L^u_{it}}{L_{it}}$	0.0667	0.0921	0.174**	-0.00393***	-0.00343**	-0.00521***
	(0.0655)	(0.0674)	(0.0702)	(0.00138)	(0.00147)	(0.00187)
$(p_{ijt-3}/P_{jt-3})\times\frac{L^u_{jt}}{L_{jt}}$	0.0188			-0.00163*		
	(0.0147)			(0.000894)		
$(p_{ijt-3}/P_{jt-3})\times\frac{L^u_{it}}{L_{it}}$	-0.0581***			0.000171		
	(0.0205)			(0.000442)		
$(p_{ijt-4}/P_{jt-4})\times\frac{L^u_{jt}}{L_{jt}}$		0.0230			-0.00160	
		(0.0172)			(0.000978)	
$(p_{ijt-4}/P_{jt-4})\times\frac{L^u_{it}}{L_{it}}$		-0.0714***			-0.000140	
		(0.0248)			(0.000503)	
$(p_{ijt-5}/P_{jt-5})\times\frac{L^u_{jt}}{L_{jt}}$			0.0183			-0.00166
			(0.0195)			(0.00107)
$(p_{ijt-5}/P_{jt-5})\times\frac{L^u_{it}}{L_{it}}$			-0.0929***			0.000657
			(0.0346)			(0.000664)
Observations	632	517	393	2496	2489	2485
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
M.E of p/P	0.00380	-0.00509	-0.01200**	0.00027	0.00023	0.00001
(Delta Method)	(0.00257)	(0.00337)	(0.00509)	(0.00199)	(0.02131)	(0.00018)
M.E of $\frac{L^u_{jt}}{L_{jt}}$	-0.03136	-0.03751	-0.04251	-0.00050	-0.00027	0.00018
(Delta Method)	(0.03970)	(0.04437)	(0.04540)	(0.00842)	(0.07738)	(0.00514)
M.E of $\frac{L^u_{it}}{L_{it}}$	-0.01084	-0.00445	0.04780	-0.00374	-0.00358	-0.00445***
(Delta Method)	(0.05602)	(0.06031)	(0.07136)	(0.02100)	(0.34159)	(0.00135)
AR(1) p-value	0.000	0.000	0.000	0.000	0.000	0.000
AR(2) p-value	0.058	0.113	0.460			
AR(5) p-value				0.782	0.797	0.696
Hansen's oid p-value	0.266	0.031	0.003	1.000	1.000	1.000

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 14: Geographically decomposed productivity change and unionization in South Korea, 1989-2019

	(1) $Struct_{jt}$	(2) $Struct_{jt}$	(3) $Struct_{jt}$	(4) $Within_{jt}$	(5) $Within_{jt}$	(6) $Within_{jt}$
L^u_{jt-4}/L_{jt-4}	-11931.8**			10828.1		
	(4657.8)			(6929.8)		
L^u_{jt-5}/L_{jt-5}		-15391.1***			17174.9**	
		(4877.6)			(7271.6)	
L^u_{jt-6}/L_{jt-6}			-13511.5***			23717.7***
			(5109.1)			(7504.6)
Constant	186.6	746.6	865.9	1461.7	913.0	1121.7
	(609.2)	(627.4)	(650.5)	(906.3)	(935.3)	(955.5)
Observations	358	341	324	358	341	324
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 15: Geographically decomposed productivity change and unionization in Taiwan, 1992-2018

	(1) $Struct_{jt}$	(2) $Struct_{jt}$	(3) $Struct_{jt}$	(4) $Within_{jt}$	(5) $Within_{jt}$	(6) $Within_{jt}$
L^u_{jt-4}/L_{jt-4}	14.39			-76.59		
	(38.37)			(145.9)		
L^u_{jt-5}/L_{jt-5}		5.916			-118.4	
		(42.72)			(162.1)	
L^u_{jt-6}/L_{jt-6}			52.81			-111.1
			(47.98)			(182.1)
Constant	0.973	0.0568	-17.73	56.73	63.37	57.55
	(18.43)	(20.21)	(22.35)	(70.08)	(76.66)	(84.81)
Observations	340	314	288	340	314	288
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figures

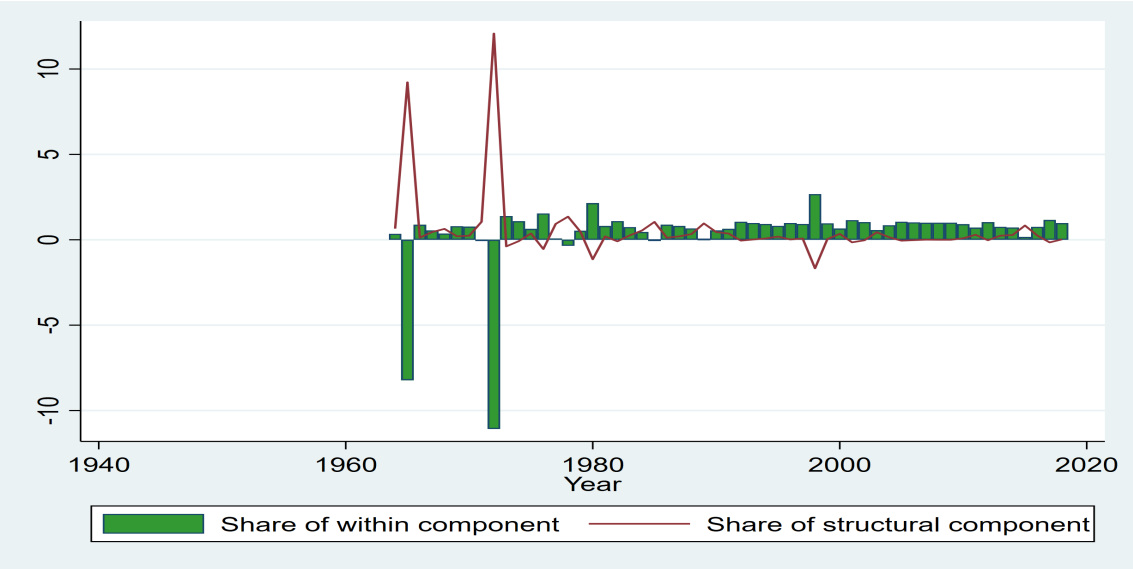

Figure 1: Productivity change decomposition of South Korea

(Two extreme years are 1965 and 1972. As the 10-Sector Database ends in 2011, Economic Transformation Database is used since 2012.)

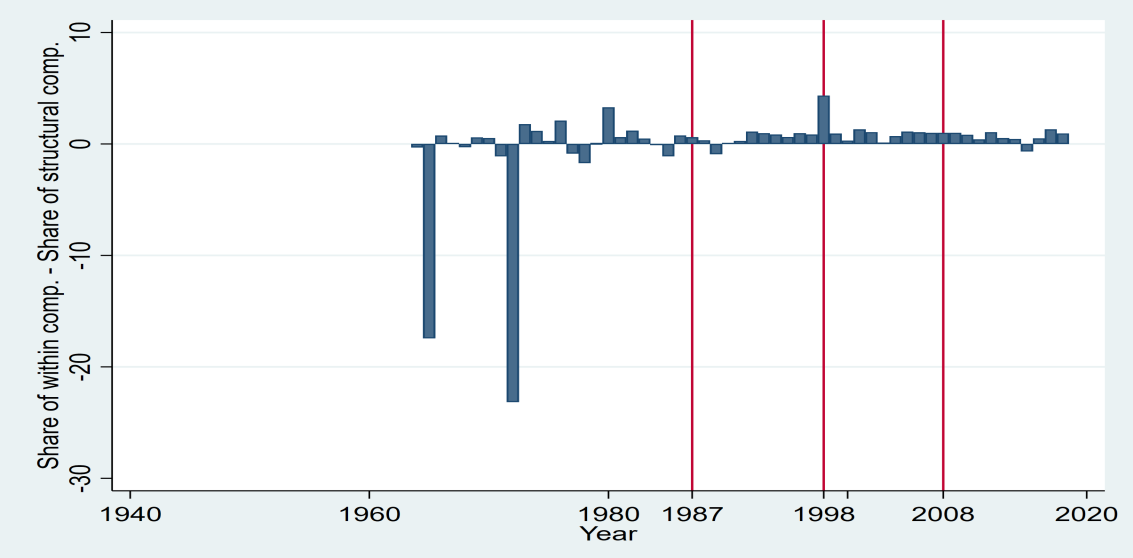

Figure 2: Share of within component minus share of structural component of South Korea.

(Two extreme years are 1965 and 1972. The positive value means that the within component was bigger than the structural component in according year. Vertical lines indicate the democratization (1987), 1st (1998) and 2nd (2008) power shifts, respectively.)

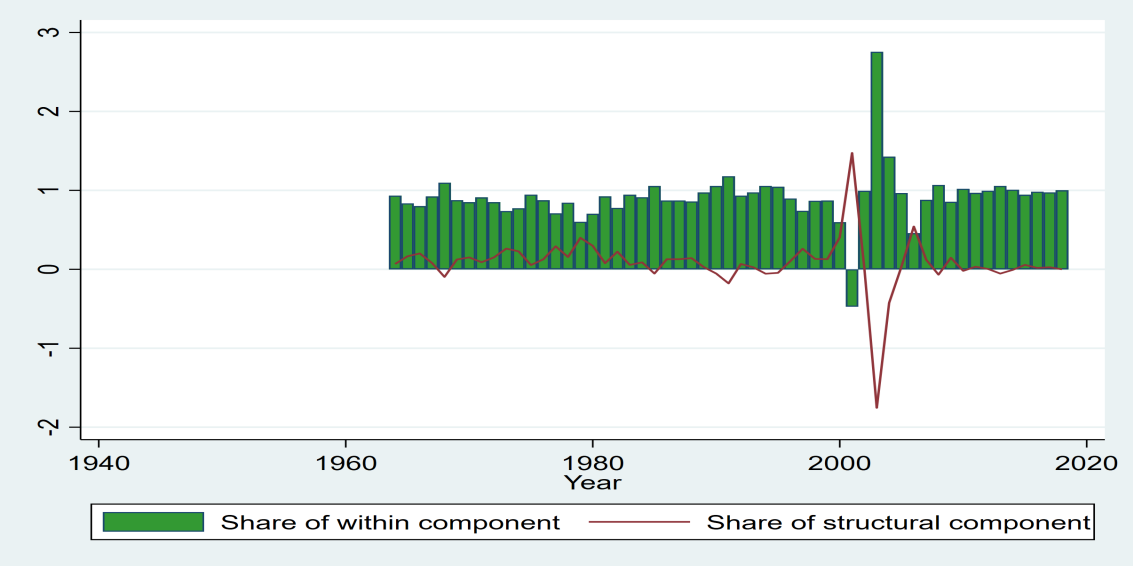

Figure 3: Productivity change decomposition of Taiwan

(As the 10-Sector Database ends in 2012, Economic Transformation Database is used since 2013.)

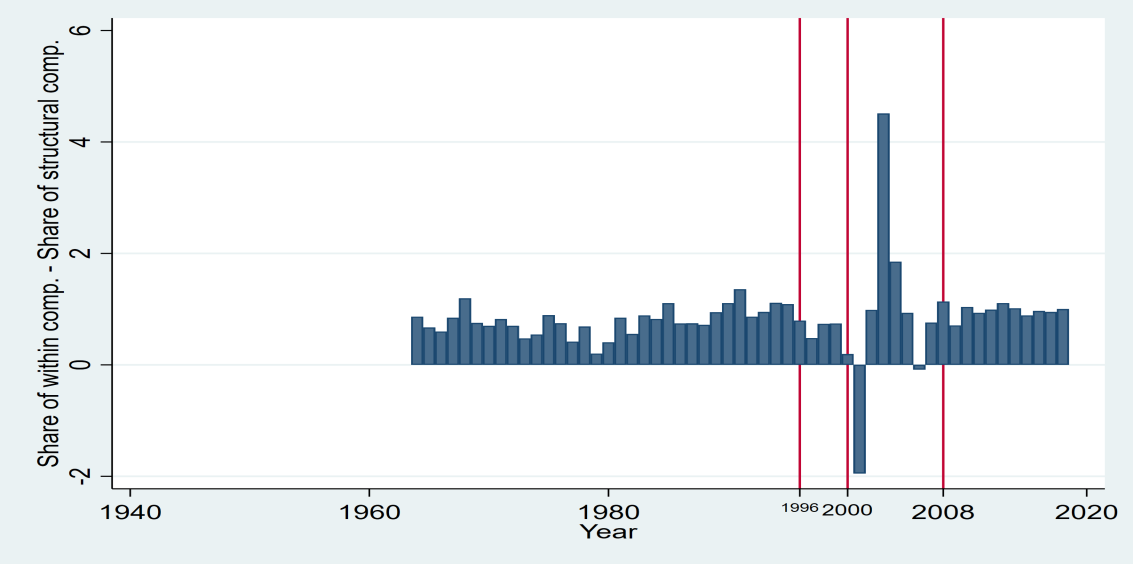

Figure 4: Share of within component minus share of structural component of Taiwan.

(The positive value means that the within component was bigger than the structural component in according year. Vertical lines indicate the democratization (1996), 1st (2000) and 2nd (2008) power shifts, respectively.)