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Performance of the Services Sector in Korea: An Empirical Investigation

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Abstract

There is a widespread perception that Korea's services sector lags behind its dynamic world-class manufacturing sector. We empirically analyze the past performance of Korea's services sector in order to assess its prospects as an engine of growth. Our analysis resoundingly confirms the conventional wisdom of an underperforming service sector. In light of Korea's high income and development level, the poor performance of modern services is of particular concern. We identify a number of factors underlying the poor performance, and set forth policy recommendations for addressing them. Overall, Korea faces a challenging but navigable road ahead in developing a high value-added services sector.

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SECTION 1: INTRODUCTION

By any measure, the Republic of Korea (henceforth Korea) has been one of the most successful economies in the postwar period.[1] Export-oriented industrialization endowed the country with a highly competitive manufacturing sector which produces and exports, among others, mobile phones, automobiles, electronics products, ships, and steel, to all corners of the world. There is, however, a general perception that Korea's services sector has long lagged its dynamic world-class manufacturing sector. There are a number of reasons why developing the services sector matters for Korea. For one, the fact that Korea's manufacturing industries are globally competitive suggests that they have reached high productivity levels and the scope for further productivity improvements is limited. In striking contrast, the services sector's productivity remains low compared to advanced economies—it was second lowest among Organization for Economic Cooperation and Development (OECD) economies, after Poland (see Cho (2009))—so there is plenty of scope for productivity improvement. Put differently, developing the hitherto underdeveloped services sector can help to sustain growth at a time when the manufacturing sector is maturing and subject to growing competitive pressures from less developed countries such as China and elsewhere. Furthermore, it will facilitate Korea's transition to a post-industrial, services-led economy.

While growth has been respectable and the economy has continued to expand at a healthy pace since the Asian crisis, there has nevertheless been a clear loss of economic dynamism since then. Korea's per capita income has reached levels where growth typically tends to slow down. At the same time, the weaker performance may partly reflect the difficult structural challenge of moving from a manufacturing-led economy to a more balanced economy in which services plays a larger role. In the case of a high-income, high-tech economy such as Korea, what is especially relevant in the context of services sector development are high-end services such as computing and business services as opposed to low-end services such as housecleaning and barber shops. In addition, while Korea's exports are skewed toward manufactured goods, there may be some high-end tradable services in which Korea has a potential comparative advantage—e.g., medical tourism.

Korea's rapid demographic transition, along with growing levels of income inequality and relative poverty, provide further impetus for a more robust services sector (Jones 2012, Noland 2012). Korea's exceptionally fast population aging is driven by the collapse of fertility to one of the lowest in the world at around 1.2 children. The country currently has the fourth youngest population in the OECD area but will have the second oldest by 2050. A large and growing elderly population will increase the demand for certain types of services. For example, the demand for health care is higher among the elderly than the

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1. Recently CNN reports that there are only two countries, Korea and Taipei, China, that have grown at an average annual pace of more than 5 percent for the last five decades in a row (available at http://globalpublicsquare.blogs.cnn.com/2012/04/25/sharma-five-decades-of-five-percent-growth/).

non-elderly. Likewise, the physical frailty of the elderly implies a greater demand for long-term care and other services involving physical assistance. In addition, the need for affordable, adequate, and sustainable old-age income support can stimulate the demand for financial services. At the same time, growing income inequality points to a need to expand social spending. In this connection, public services, which enhance the productivity of low-income groups through education, training, and re-training and thus improve equality of opportunity, are critical.

In this paper we examine the performance of Korea's services sector. In section 2 we empirically examine and confirm the conventional wisdom that Korea's services sector lags its manufacturing sector. In section 3 we analyze some possible factors underlying the poor performance of Korean services. Section 4 sets forth some policy options for strengthening Korea's services sector. Section 5 concludes the paper.

SECTION 2: THE PERFORMANCE OF KOREA'S SERVICES SECTOR: AN EMPIRICAL ASSESSMENT

As noted above, there is a widespread perception that Korea's services sector performs poorly relative to its dynamic world-class manufacturing sector.[2] In this section, we empirically investigate the extent to which this perception is borne out by actual data.

Figure 1 of Park and Shin (2012) shows the shares of agriculture, industry, and industry in employment during 1980–2000 and their shares in GDP during 1960–2000. The share of agriculture continuously declined. Interestingly, although the process of industrialization started in the 1960s the share of agriculture exceeded 30 percent even in 1980. The trend is consistent with the stylized fact of the demographic hollowing out of rural areas which leaves them with an increasingly older population. Up to the early 1990s, the share of both industry and service in employment rises as rural residents, especially younger residents, moved to the cities during the industrialization process. Since the early 1990s, with the advent of deindustrialization and Korea's shift into the post-industrial phase, the share of industry fell but the share of services continued to rise.

The share of the three sectors in GDP shows a similar pattern. As might be expected, the share of agriculture fell sharply and continuously as Korea industrialized. The share of industry rose steadily until the early 1990s when it peaked and has more or less stabilized since then, albeit with substantial volatility. On the other hand, the share of services in GDP rose steadily until the early 2010s although it has fluctuated around 60 percent since then. A comparison of the evolution of the shares of services in employment and GDP since 1980 reveals a marked difference between the two. More precisely, the share of services in employment has grown noticeably faster and more consistently than its share in GDP. Output growth has thus failed to keep pace with employment growth in services.

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2. See Jones (2009).

A well-known stylized fact of economic growth and development is that the share of services in GDP tends to increase as a country becomes richer. Figure 1 shows how the share of services sector in Korea's GDP and employment evolved over time as its per capita GDP increased rapidly. We follow Eichengreen and Gupta (2009) and Park and Shin (2012) to estimate a quartic relationship between per capita GDP and the shares of the service sector in GDP and employment. Figure 1(a) shows and compares the actual shares of the service sector in Korea's GDP with the line fitted on the basis of the quartic regression for two sub-periods: 1970–1989 and 1990–2010. We divide the sample period at 1990 because Korea's deindustrialization (in terms of employment) started around this year. Figure 1(b) shows and compares the actual shares of the services sector in Korea's employment with line fitted on the basis of the quartic regression for two sub-periods: 1980–89 and 1990–2010. Since employment data are available from 1980 onward, the first year in this figure is 1980. In both figures we denote the 95 percent confidence bands by grey lines. While the share of the service sector in GDP lies below the predicted line in both periods, 1970–1989 and 1990–2010, the share of the service sector in employment lies more or less on the predicted line. This implies that labor in Korea's service sector does not produce as much value added as other countries of a similar per capita GDP levels.

Table 1 reports the average output—value added—and employment shares of the service sector for various countries for various decades. Both output and employment shares of the service sector have continuously increased in most countries. However, for example in 2009, the GDP share of services in Korea is much lower than that in developed countries. While the employment share in Korea is lower than that in developed countries, the gap is much smaller. Therefore, not only has Korea's services output growth lagged its services employment growth over time, but relative to developed countries, Korea's services output lags its services employment. Both trends imply weak labor productivity growth in Korea's services sector. It is also striking to compare Korea's services sector performance to that of Taipei, China, a fellow newly industrialized economy (NIE) at a similar income level. In 2009, Taipei, China, had a higher GDP share of services—68.5 percent versus Korea's 61.0 percent—along with a higher employment share—67.8 percent versus Korea's 58.9 percent. While Korea's services share of GDP is comparable to that of South American countries and Eastern European countries, its services share of employment is higher than those of other countries except Argentina. As emphasized by Eichengreen, Perkins, and Shin (2012), the employment share of services grew at an exceptional speed in Korea, surging from 37 percent in 1980 to 67.8 percent by 2009. This suggests that the deindustrialization process may have been too fast and labor productivity growth in the service sector has not kept pace with it.

Table 2 reports the labor productivity growth rate for the same group of countries during the same period as in table 1. In Asian and Eastern European countries, in general, the labor productivity growth rate in services is lower than in industry. This is in line with the widespread perception of Asian

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economies, especially those in East and Southeast Asia, as having relatively well-developed manufacturing sectors and underdeveloped service sector. The exception is India, where the labor productivity growth rate in service is much higher than in industry. This is not surprising in light of India's well-known success as the world's foremost information communications technology and business process outsourcing (ICT-BPO) services exporter.[3] In South American countries and developed countries, labor productivity growth rate in services is as high as or only slightly lower than in industry. In Korea's case, however, there is a huge gap between the labor productivity growth of industry and services. In both the 1980s and 2000s, compared to other countries, the difference is largest in Korea. Again, in the international context, Korea's services sector underperforms and underperforms noticeably.

Figure 2 shows relative labor productivity of the services sector. The index is calculated by dividing labor productivity of the service sector by aggregate labor productivity. If it is greater (less) than 1, labor productivity of the service sector is higher (lower) than aggregate labor productivity. Therefore, the index gauges whether the services sector workers are more or less productive than workers in the economy as a whole. We measure it twice, for the averages of the 1990s and 2000s. Relative services labor productivity is higher than 1 in a number of countries. In general, it is higher the less developed the country. This is due to the large share of the agricultural sector in less developed countries. Korea's relative productivity is less than 1 in both periods and even declines between the 1990s and 2000s. Given Korea's income and development level, its relative services labor productivity seems noticeably low.

According to Eichengreen and Gupta (2009), there are two distinct waves of service sector growth and development. In the first wave, the services sector share of output begins to rise at relatively modest incomes but at a decelerating rate as the economy grows. In the second wave, the share rises again at higher level of incomes. Importantly, the two waves are populated by different kinds of services. The first wave is characterized by the rise of the traditional services—lodging, meal preparation, housecleaning, beauty, and barber shops—while the second wave is dominated by the supplementation of modern services—banking, insurance, computing, communication, and business services. Based on the above findings, they defined three groups of services according to whether their shares of GDP have fallen, risen slowly, or risen rapidly over time.[4] The first group (group I) includes traditional services: retail and wholesale trade, transport and storage, public administration and defense. In many countries, particularly in advanced countries, the share of this group in GDP has fallen noticeably over time. The second group

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3. See, for example, Gordon and Gupta (2004).

4. Eichengreen and Gupta did not include real estate activities, private households with employed persons, and extra-territorial organizations and bodies in the classification of group I, II, and III. Moreover, due to an update in 2011, data on two industries—renting of machinery and equipment, and legal, technical, and advertising—are no longer reported separately and they are included in other business activities.

(group II) is a hybrid of traditional and modern services and this group includes education; health and social work; hotels and restaurants; and other community, social, and personal services. Their shares rise slowly with time. The final group (group III) consists of modern services consumed by both the household and corporate sectors and this group includes financial intermediation, computer services, business services, communication, and legal and technical services. The share of the final group in GDP has been increasing very rapidly in recent years. In light of its high income and development level, what is most relevant and crucial for Korea is to develop services in group III.

Table 3 shows the shares of service group I, II, and III in (a) output (GDP) and (b) employment. In each panel, the first column is for the United States, the second column for the EU-15 average, and the third column for Korea. The share of the first group in output decreased over time in all three cases. However, its share is still large comparable to that of either group II or III. In fact, in Korea it still remains the largest group. The share of the second group in output increased moderately over time. The share of the third group increased most rapidly over time. Korea's share of every group is lower than that of either the United States or European Union. In particular, the share of the third group in output is particularly small for Korea. This is mainly due to the low share of other business activities. Other business activities include all the business related services not related to real estate activities and they are a key area where productivity growth is high in many advanced countries. Other than business activities, the output share of health and social work is also particularly small.

The employment share shows a similar pattern over time. One difference is that the share of the first group for EU-15 countries did not decrease over time. The difference in the employment share between Korea and the European Union is very small in group I and II. However the difference remains still large in group III. The employment share of health and social work, and other business activities is especially small.

There are some subcategories such as other community, social, and personal service, and hotels and restaurants, where the employment share of Korea is particularly large. Areas where output share is very low relative to employment share are: group I (wholesale trade, transport, and storage), group II (other community, social, and personal), and group III— (other business activities). These are thus service subcategories where Korea suffers from serious labor productivity problems.

While labor productivity captures how productive workers are, total factor productivity (TFP) captures the efficiency with which all factors of production are used. Table 4 reports the growth rate of TFP in the service subsectors. We use TFP growth for industry value added, obtained from the EU KLEMS (capital, labor, energy, materials, services) database.[5] It calculates TFP growth by subtracting

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5. A detailed explanation on the calculation of TFP in the EU KLEMS database can be found in Timmer, O'Mahony, and van Ark (2007).

weighted cost share of capital and labor inputs growth from the industry value-added growth at constant prices. Instead of using standard measures of labor input, such as numbers employed or hours worked, it measures labor input as labor services which takes the heterogeneity of the labor force into account. Our key findings are as follows. TFP growth in group III is not always higher, but it is higher than in group I or II in the most recent period, 2001–07, in all three economies. Despite its low level of technology relative to the United States or European Union, Korea's growth rate of TFP in group I and II is as low as in those two economies. The growth rate of TFP in group III for Korea is higher than in the United States and European Union. However, this is probably due to the high growth rate of TFP in financial intermediation and post and telecommunication. The growth rate of TFP in other business activities is particularly low in Korea. Our results for TFP growth are generally consistent with those for labor productivity growth.

In sum, the evidence from this section resoundingly confirms the conventional wisdom that Korea's service sector performs poorly and lags its world-class manufacturing sector. This implies that there is plenty of scope for developing the services sector and more well-developed services can contribute a lot to economic growth and dynamism. Among the service sectors, it is business related activities which are most far behind. Yet it is precisely such service activities which are most pivotal to strengthening the services sector in a high-income economy such as Korea. Other service areas which perform poorly include wholesale trade, transport and storage, and other community, social, and personal services.

SECTION 3: WHY DOES KOREA'S SERVICES SECTOR PERFORM SO BADLY? SOME POSSIBLE EXPLANATIONS

In the preceding section, we saw that Korea's services sector performs poorly in the international context, especially relative to its income and development level. The obvious question to ask is why? In this section, we will explore four possible explanations.[6] First, too rapid deindustrialization, most evident in the sharp rise in the share of services in employment, may have led to a lot of underemployment in marginal services jobs. Second, government regulations and restrictions, which are designed to protect small and medium enterprises (SMEs) and services sector jobs, may hold back the growth of the services sector. Third, relatively low research and development (R&D) expenditures in the services sector and low ICT investments may hinder innovation in services and thus movement to high value-added service activities. Fourth, barriers to services trade and foreign direct investment (FDI), designed to protect domestic

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6. Jones (2009) also examines factors behind the low productivity of the Korean services sector.. In particular. he emphasizes (1) the legacy of an export-led growth strategy that attracted the most productive resources into manufacturing, (2) insufficient competition in services due to heavy regulations, (3) low R&D and ICT investment, and (4) the weakness of SMEs.

firms and industries from foreign competition, weaken their incentives to become more efficient. We now examine each of the four potential explanations in more detail.

Too Rapid Deindustrialization and Underemployment in Services

As evident in table 1 above, the share of services in employment grew at an exceptional speed.[7] The frantic pace of the reallocation of labor from manufacturing to services in Korea has made it difficult for some workers to find new employment and hence they end up in disguised unemployment in the service sector, which contributes to low productivity growth in the service sector. That is, they end up underemployed in marginal services sector jobs. Based on shift-share analysis, Eichengreen, Perkins, and Shin (2012) find that roughly 70 percent of the growth of aggregate labor productivity in Korea in 1970–2007 was attributable to the within effect—i.e., economy-wide increases in productivity holding sectoral shares constant—which is not due to the reallocation of workers. In particular, they find that it was manufacturing with its relatively fast productivity growth that mainly accounts for the within effect. The role of the shift effect that is due to reallocation of workers from low productivity to high productivity sectors is relatively minor. Therefore, it is clear that labor reallocation from manufacturing to service sectors did not contribute a lot to productivity growth. To the contrary, the too rapid reallocation of labor to the service sector holds down the growth of service sector productivity.

Government Regulations and Restrictions

While the objective of the Korean government's regulations and restrictions on the services sector is to protect SMEs and jobs, there is a serious risk that they end up stifling the growth and dynamism of the sector. We follow Woefl et al (2010) to construct table 5 based on the concept of product market regulation (PMR) indicators. According to Woefl et al (2010), the underlying idea behind the PMR indicators is to turn qualitative information such as laws and regulations that may affect competition into quantitative indicators. They seek to measure regulations which are potentially anti-competitive in areas where competition is viable, and look primarily at policy settings instead of market outcomes. The economy-wide PMR indicator covers both general and sectoral regulatory issues in three domains—state control, barriers to entrepreneurship, and barriers to trade and investment.

Table 5 reports PMR scores for the three domains for OECD average and five Asian countries—China, India, Indonesia, Japan, and Korea.[8] Korea's economy-wide PMR score is 1.48, a little bit higher than OECD average (1.36) but much lower than that of other countries such as China (3.30), India (2.84), and Indonesia (2.73). A lower score means less restrictions. The indicator for state control in Korea (1.99) is lower than that of the OECD average (2.04). The indicator for barriers to

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7. This is also emphasized by Kim (2006) as a structural problem for the Korean economy.

8. For Asia, the PMR indicators are available for only five countries.

entrepreneurship is also lower for Korea (1.14) than the OECD (1.42). However, Korea does poorly in the score for administrative burdens on startups, especially for corporation—i.e., Korea (2.75) vs. the OECD (1.36). Korea does particularly poorly in the score for barriers to entry in services—i.e., Korea (2.31) vs. the OECD (1.76). In this category, in fact, Korea fares even worse than India and Indonesia. Korea also scores poorly in the indicators for barriers to trade and investment—i.e., Korea (1.30) vs. the OECD (0.63). In particular, the scores for tariffs (Korea's 2.00 vs. the OECD's 1.31) and other regulatory barriers(1.60 vs. 0.79) are low.

A lot of government restrictions on the services sector are geared toward the protection of employment in SMEs. As such, it would be useful to examine the status of SMEs in Korea. The relative labor productivity as measured by the relative value added per person employed in SMEs for the service sector as a whole changed from 49 percent (=26.1/53.3) of large firms in 2001 to 41 percent (=61.1/148.1) in 2009 (as calculated from the bottom line). The problem of poor labor productivity in SMEs thus grew worse since labor productivity growth over the past ten years was considerably higher among large firms than among SMEs.

The problem is more severe in more traditional services sectors. The relative labor productivity of SMEs in group I plunged from 52 percent to 29 percent during the same period. The relative productivity of SMEs in group II declined from 58 percent to 36 percent, and from 92 percent to 66 percent in group III. A sizable gap in productivity between large and small firms is evident in every group. However, as a result of different relative productivity growth, the gap is now smallest in group III. This reflects the fact that the regulations tend to protect SMEs engaged in more traditional services. More specifically, the gap is particularly large in wholesale and retail trade, hotels and restaurants, education, arts and sports, and real estate and renting, where restrictive regulations are heavy and low-productivity SMEs can still survive. However, it is worrisome that the productivity gap is also widening even in the most modern service sector, group III. Heavy government protection of SMEs is motivated by their high share in employment. The share of SMEs in employment even increased further from 86.3 percent to 91.2 percent (total), 90.9 percent to 95.7 percent (group I), 92.1 percent to 93.9 percent (group II), and 71.2 percent to 78.9 percent (group III).

Low R&D Expenditures and Low ICT Investment

Another possible explanation for the poor performance of the service sector in Korea is relatively low R&D expenditures and low ICT investment, which hinder innovation in services and moving up the value chain toward higher value-added services activities.[9] R&D intensity of a sector is measured as R&D expenditures as a percentage of value added in the sector. Data are collected from OECD *STAN*

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9. There are a number of studies that find that ICT investment enhances productivity. See, for example, Fernald and Ramnath (2004).

Indicators. The data are for the most recent years available, 2004–09. The R&D intensity of Korea's manufacturing is higher than the OECD average. It is ninth highest out of 33 countries. In contrast, the R&D intensity of Korea's services sector is lower than the OECD average. It is only eighteenth out of 33 countries. Therefore, in Korea there are visibly more innovative investments in the manufacturing sector than in the services sector. This may help to explain why services lag behind manufacturing in productivity. As evident in figure 3, for every services group, R&D intensity in Korea underperforms the OECD average. The gap is largest for group I, which is subject to most regulatory restrictions and thus provides the least incentive for investing in R&D.

In the EU KLEMS database, ICT investment is defined as investment in computing equipment, communication equipment, and software. From ICT investment, the database constructs ICT capital. Then based on the standard growth accounting exercise, value-added growth is decomposed into the contributions of capital—both ICT and non ICT, labor, and multifactor productivity. In general, ICT contribution is largest for group III, followed by group II, and lowest in group I. This is intuitively plausible because modern services stand to gain the most from application of ICT. In general, ICT's contribution to value added growth grows larger over time if we exclude the last subsample period. Interestingly, ICT's contribution declines in every country in the last period. As might be expected, ICT's contribution is larger in group III, the modern service sector, than in group I or II. When we compare Korea with the United States and European Union, the contribution of ICT capital in Korea is lower and it is markedly lower for group I. The difference is smallest in group III. The only exception is telecommunication, the one sub-category of group III where the contribution of ICT capital in Korea actually exceeds that of the European Union and United States.

Barriers to Services Trade and Barriers to FDI in Services

Just like barriers to goods trade and barriers to FDI in manufacturing, the main objective of barriers to services trade and barriers to FDI in services is to protect domestic firms and industries from foreign competition. The standard argument for opening up trade and FDI is also identical for both manufacturing and services—they encourage domestic firms and industries to become more efficient in order to survive foreign competition. By the same token, the standard argument against barriers to trade and FDI in both sectors is that they hamper productivity growth by diluting competitive pressures and hence incentives of domestic players to raise their game.

Table 6 reports the share of services trade in total trade for twelve Asian countries, along with selected major South American countries, Eastern European countries, and developed countries. In most countries, service trade share in total trade has increased over time. This is particularly true in India and the United Kingdom. It also has increased in Korea, but the increase is minimal, particularly from 2000

to 2010. Compared to other Asian countries, Korea's services trade share is not large; in fact, it is smaller than Hong Kong, Pakistan, Philippines (except in 2000), and Singapore. Korea's share is comparable to that of South American countries and Eastern European countries, and it is lower than that in most developed countries. The only exception is Germany, which is well known for its strong bias toward manufacturing and relatively underdeveloped services. In Korea, the share of services in imports is larger than that in exports (except in 1990). This is also true for South American countries. In the case of Korea, the difference grows larger over time. In developed countries except Germany and Eastern European countries, the share of services in exports exceeds its share in imports.

Table 7 reports and compares the trade performance of selected major economies in the manufacturing sector versus the services sector. Korea is the world's fifth largest exporter and thirteenth largest importer of manufactured goods. The fact that Korea ranks among the world's five biggest exporters of manufactures is a vivid testament to its status as a globally significant manufacturer. Korea generally runs a large trade surplus in manufactured goods. In contrast, Korea plays a visibly smaller role in global services trade. Korea is the world's fifteenth largest exporter and eleventh largest importer of services. Most notably, Korea's rank as an exporter of services (15) is much lower than its rank as an exporter of manufactured goods (5), lending further support to the notion that Korea's services sector lags its manufacturing sector. In contrast to its large surplus in manufactures trade, Korea runs a deficit in services trade.

We estimate a gravity equation for Korea's total trade and services trade, and compare the two to see if there are significant differences between the two. The specification of the gravity equation is as follows:

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\begin{aligned}
\ln(Trade_{ijt}) = {} & \beta_0 + \gamma Korea + \beta_1 \ln Dist_{ij} + \beta_2 \ln(Pop_{it}) + \beta_3 \ln(Pop_{jt}) + \beta_4 \ln(GDP_{it}) \\
& + \beta_5 \ln(GDP_{jt}) + \beta_6 CU_{ijt} + \beta_7 Language_{ij} + \beta_8 RTA_{ijt} + \beta_9 Border_{ij} \\
& + \beta_{10} Island_{ij} + \beta_{11} \ln(Area_i \, Area_j) + \beta_{12} ExComColony_{ij} \\
& + \beta_{12} CurColony_{ij} + \beta_{13} ExColony_{ij} + \delta YEAR_t + \varepsilon_{ijt}
\end{aligned}
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$$(1)$$

Where i and j denote countries, t denotes time, and the variables are defined as:

- $Korea$ is a binary variable which is unity if country i is Korea.
- $Trade_{ijt}$ denotes the average value of real bilateral trade between i and j at time t.
- $Dist_{ij}$ is the distance between i and j.
- Pop_{it} is population.
- GDP is real GDP.

- CU_{ijt} is a binary variable which is unity if i and j belong to the same currency union.

- *Language* is a binary variable which is unity if i and j have a common language.

- RTA_{ijt} is a binary variable which is unity if i and j belong to the same regional trade agreement at time t.

- *Border* is a binary variable which is unity if i and j share a land border.

- *Area* is the land mass of the country.

- *Island* is the number of island countries between i and j.

- *ExComColony* is a binary variable which is unity if i and j were ever colonies after 1945 under the same colonizer.

- *ExColony* is a binary variable which is unity if i ever colonized j or vice versa.

- $CurColony_{ijt}$ is a binary variable which is unity if i and j are currently in a colonial relationship at time t.

- *Year* is a set of binary variables which are unity in the specific year t.

The total trade data are collected from the *Directions of Trade* database. The service data are collected from the OECD. The GDP and population data are from Penn World Table 7.0. Other data are obtained from Rose and Spiegel (2011) except for the regional trade agreement (RTA) dummy, which is extended by using the reports to CEPII and the World Trade Organization (WTO).

We use total exports (imports) as the dependent variable in table 8 and service exports (imports) as a dependent variable in table 9. All variables except for the binary variables are taken logarithm. We drop the observations if either total trade or services trade takes zero or negative values.[10] In both tables, the first and third columns are for exports and the second and the fourth columns for imports. We also include a Korea dummy in the last two columns. A number of findings emerge from our estimation of the above gravity equation. The fit of the gravity equation for service trade is as good as the fit for total trade. The estimated coefficients for distance and number of islands are smaller when we use service trade as a dependent variable. Service is weightless, which means that physical distance and shipping matters less than for goods trade. The estimated coefficient for common language is larger for service trade. Communication matters more for service trade. The effects of currency union and regional trade on service trade are at least as large as their effects on total trade. The estimated coefficients for colony related variables are larger for service trade. Again, communication matters more for service trade. The estimated

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10. Dropping zero or negative trade values may generate biased estimates, but Linders and de Groot (2006) suggests that this bias is negligible in practice.

coefficient for the Korea dummy is positive in both cases but it is smaller for service trade. This implies that Korea trades more in goods and services and in services alone than a comparable country but the degree of over-trading is less for service trade.

With respect to FDI inflows, the share of services sector FDI in total FDI was much smaller than the OECD average in 2006. The share of service sector FDI grew but still remains smaller than the OECD average in 2010. Furthermore, the share of group III in total services sector FDI inflows is lower in Korea than the OECD average.

SECTION 4: POLICY IMPLICATIONS

The analysis of the previous two sections, which empirically confirmed the poor performance of Korea's services sector and tested some potential explanations for the poor performance, gives rise to some policy implications. In this section, we explore policy options for improving the performance of Korea's underperforming services sector. Some of our policy options echo those of Pilat (2005) and Jones (2009) although they are more Korea-specific.

Policies to Cope with Too Rapid Deindustrialization and Underemployment in Services

The very rapid rise in the services sector's share of employment, in conjunction with a markedly slower rise in its share of GDP, implies that the sector has been acting as an absorber of surplus workers who are unable to find productive employment in the face of the structural transformation. Since many of those workers end up in marginal, low-productivity, low-wage services jobs, this brings down the productivity of the services sector. The appropriate policy response does not involve slowing down the pace of deindustrialization, which reflects market forces and contributes to the dynamism and efficiency of Korea's world-class manufacturing sector. Instead it should be based on facilitating and mitigating the large adjustment costs associated with the structural shift from manufacturing to services. For example, more flexible labor markets can help to reduce the structural unemployment arising from deindustrialization. Similarly, more assistance to those workers seeking new jobs, for example well-designed training programs, can help dislocated workers from the manufacturing sector look for and find jobs which better match their qualifications in the new services industries.

Policies to Speed Up Korea's Successful Transition to a Post-Industrial Economy

Those sets of policies are related to and complementary to policies to cope with too rapid deindustrialization. According to our analysis, what lies at the heart of the poor performance and underdevelopment of Korea's services sector is a failure to move into higher value-added services activities. While Korea's income is converging toward OECD levels, in one important sense, its economic structure is

not. Although the share of services in both employment and output has been rising, much of the growth has come from traditional services rather than modern services. That is, while Korea's services sector has experienced quantitative expansion, it has a lot of scope for qualitative leveling up. Korea's large services imports and persistent deficit in services trade suggests that there is substantial demand for services. In particular, Korea's high income and development level implies a large demand for high-end services. One obvious policy implication is for government to subsidize the training and re-training of workers so they can help to meet this demand. In addition, the government can provide fiscal and other incentives to promote high value-added services such as design and prototyping at the beginning of the global value chain (GVC) and marketing and branding at the end of the GVC. According to the smile curve hypothesis, most of the value added in GVC lies in high-end services activities at both ends of the GVC rather than pure manufacturing, or simply making things, in the middle.

Deregulation

Our analysis indicates that Korea's services sector faces substantial government regulations and restrictions, which aim to protect SMEs and SME jobs in the sector. Examples of such regulations and restrictions include strict entry and licensing requirements, stringent approval requirements, and significant government involvement and price controls. Since the very objective of Korea's services sector regulations is to protect a specific group of firms from competition, they reduce competitive pressures and are likely to be a significant contributor to the sector's poor productivity performance. According to Pilat (2005), OECD countries' experiences with regulatory reforms have been, by and large, very positive. For example, in many OECD countries, deregulation of air passenger transportation and road freight has delivered substantial benefits in the form of lower prices, new services, and higher labor and capital productivity. However, given the often large adjustment costs of services deregulation—e.g., the entry of a big supermarket chain wiping out small neighborhood stores—it is probably best to pursue services deregulation as a gradual, evolutionary process.

More R&D Expenditures and More ICT Investment

Relative to other OECD countries, Korea's R&D expenditures and ICT investments are relatively low. This can be a significant barrier against innovation in services and moving up the value ladder toward higher value-added services. Some of the policies that are beneficial for innovation in services are beneficial for innovation in general. For example, strengthening intellectual property protection will strengthen incentives for R&D and other innovative activities in both services and manufacturing sectors. At the same time, given the potentially large positive spillovers from services innovations, the government has to resolve the tradeoff between encouraging innovation and the diffusion of innovation to the rest of the economy. It is also possible to directly stimulate R&D in services by providing tax credits and grants. One technology which is a particularly powerful tool for improving services productivity is ICT,

which has revolutionized the delivery of services. In order to maximize the potential benefits of ICT for services, the government should ensure a competitive environment in the ICT industry. Innovation will be especially helpful for modern services, where Korea lags visibly.

In ICT-advanced countries such as the United States, the private sector plays an important role so that many ICT investments are made via venture capital provided to creative venture firms. Venture capital for ICT activities in Korea slowed down markedly after the ICT bubble burst in 2001 and began to bounce back only in 2006.[11] However this recovery was largely attributable to government support through policy funds such as the Korea Venture Fund. Heavy direct involvement of the government in providing venture capital can result in inefficient allocation of funds. Therefore, policy should be directed more toward stimulating private venture capital which eventually contributes to efficient ICT investment in the service sector.

Remove Barriers to Services Trade and Barriers to FDI in Services

Barriers to services trade and FDI inflows into services protect domestic firms and industries from foreign competition, and thus dilute their incentives to innovate and raise their productivity. Therefore, liberalizing trade and FDI can potentially contribute to improved efficiency in the services sector. According to Pilat (2005), OECD studies find that trade and FDI in services delivers large benefits for OECD economies and developing countries alike. In the case of Korea, it is widely believed that opening up various sectors to FDI as part of post-Asian crisis structural reforms brought about substantial productivity gains.[12] In recent years, Korea has been pursuing free trade agreements (FTAs) with trade partners in both the developed world and developing world. In view of the potentially large benefits of services trade, in the future Korean policymakers should consider high-level FTAs which explicitly incorporate services trade. In fact, Korea's recently formed FTAs with the United States and European Union are good examples of such high-level FTAs that seek to promote services trade. International investment agreements (IIAs) lubricate FDI in both services and industry. Even in the absence of IIAs, policymakers can unilaterally reduce barriers to FDI.

SECTION 5: CONCLUDING OBSERVATIONS

The Korean economic miracle is largely based on a dynamic world-class manufacturing sector which exports goods all over the world. Korean manufacturers such as Samsung, Hyundai, and LG are world leaders in their respective industries, and make and export a wide range of high-tech manufactured goods such as mobile phones, LCDs, and automobiles. High savings and investment rates enabled

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11. See Lee (2011).

12. For example, Kim and Kim (2003) find a productivity improvement in distribution services where there was a large inflow of FDI due to liberalization in the 1990s.

Korea to quickly build up a large stock of physical capital in the manufacturing sector. Just as importantly, openness to advanced foreign technology and a well-educated workforce capable of learning and absorbing such technology allowed Korea's manufacturing sector to technologically level up rapidly. While this growth model of export-oriented industrialization delivered sustained fast growth for decades, Korea currently finds itself at a pivotal crossroads between a manufacturing-led past and an increasingly services-oriented future. Korea's manufacturing sector is maturing with high productivity levels and limited room for further growth. This means that the services sector, especially productivity growth in that sector, will have to play a bigger role in Korea's future growth. All the more so since Korea's exceptionally rapid population aging, combined with growing income equality, implies greater scope for certain services—e.g., health care, long term care, and basic public services.

Korea's experience of industrialization and deindustrialization is in line with the earlier experiences of the advanced economies. The share of industry and services in output and employment typically rise at the expense of agriculture during the industrialization process. As industry matures and deindustrialization sets in, the share of services rises at the expense of industry while agriculture continues to fall. In the case of Korea, the core problem is that although the share of services in output and employment has risen, its productivity growth has underperformed. Our analysis resoundingly confirms the popular belief that Korea's services sector still lags the manufacturing sector even though deindustrialization already began in the early 1990s. Therefore, the center of gravity of the Korean economy is shifting from a dynamic world-class manufacturing sector to a stagnant third-class services sector, dragging down productivity growth for the economy as a whole. The central challenge for Korea in the post-industrial phase is thus to overhaul and upgrade its services sector so that a productive, high value-added, modern services sector can become an engine of growth.

The underwhelming performance of Korea's services sector up to now gives rise to serious doubts about its future contribution to aggregate growth. Furthermore, we saw that the sector faces a daunting array of impediments it must overcome if it is to fulfill its potential. For example, while deregulation can unleash competition and thus encourage Korea's services firms to raise their game, their underlying motivation—protection of SMEs and SME jobs—makes it politically difficult to pursue. Nevertheless, upon closer inspection, there are some grounds for optimism about the Korean services sector's prospects. Above all, high value-added services activities, which are the biggest area of weakness in Korea's services sector, require high levels of human capital. Korea's highly educated workforce, which enabled it to quickly move up the technological ladder, can in principle also serve as a key ingredient in the leveling up of Korea's services sector. In addition, the Korean entertainment industry's well-known success in exporting its products—i.e., the Korean wave—suggests that it is possible for Korea to become a major services exporter. Notwithstanding such strengths, Korea faces a formidable challenge in upgrading its services sector.

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Figure 1   Service sector GDP and employment shares and per capita GDP

(a) GDP share and per capita GDP

Korea (1970–89)

Korea (1990–2010)
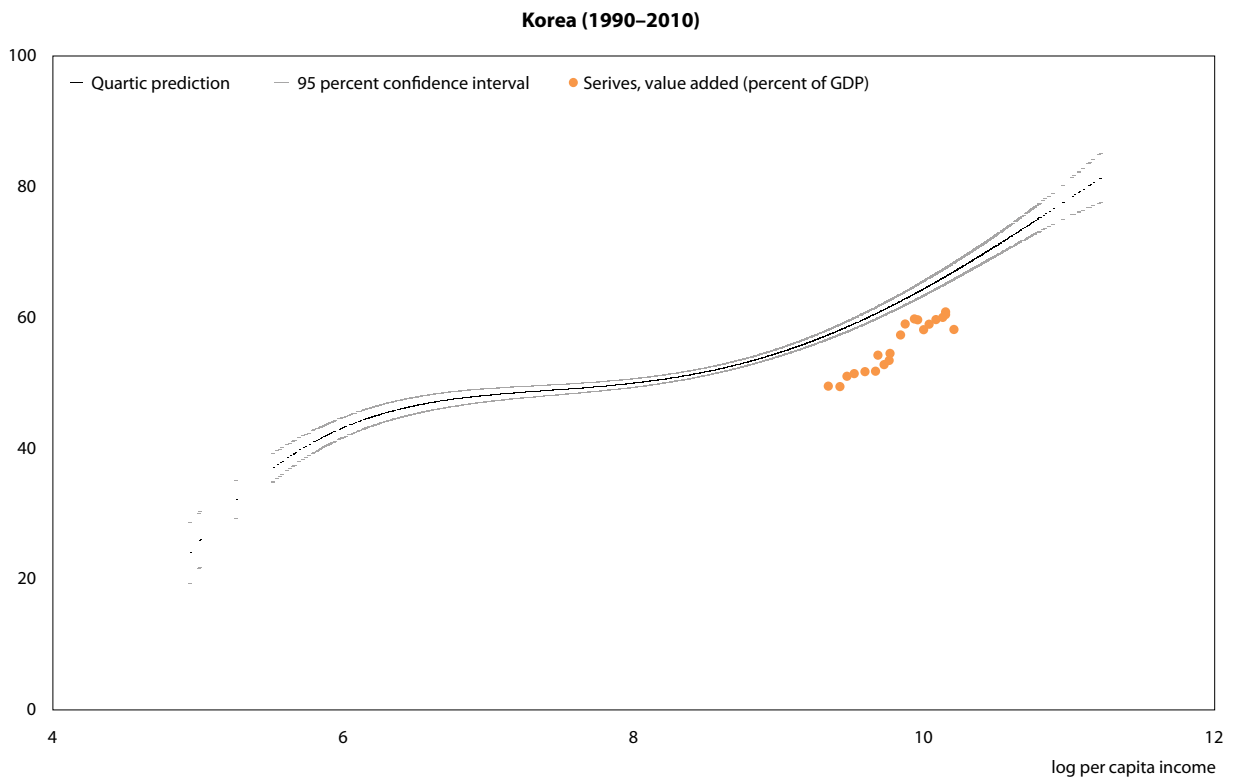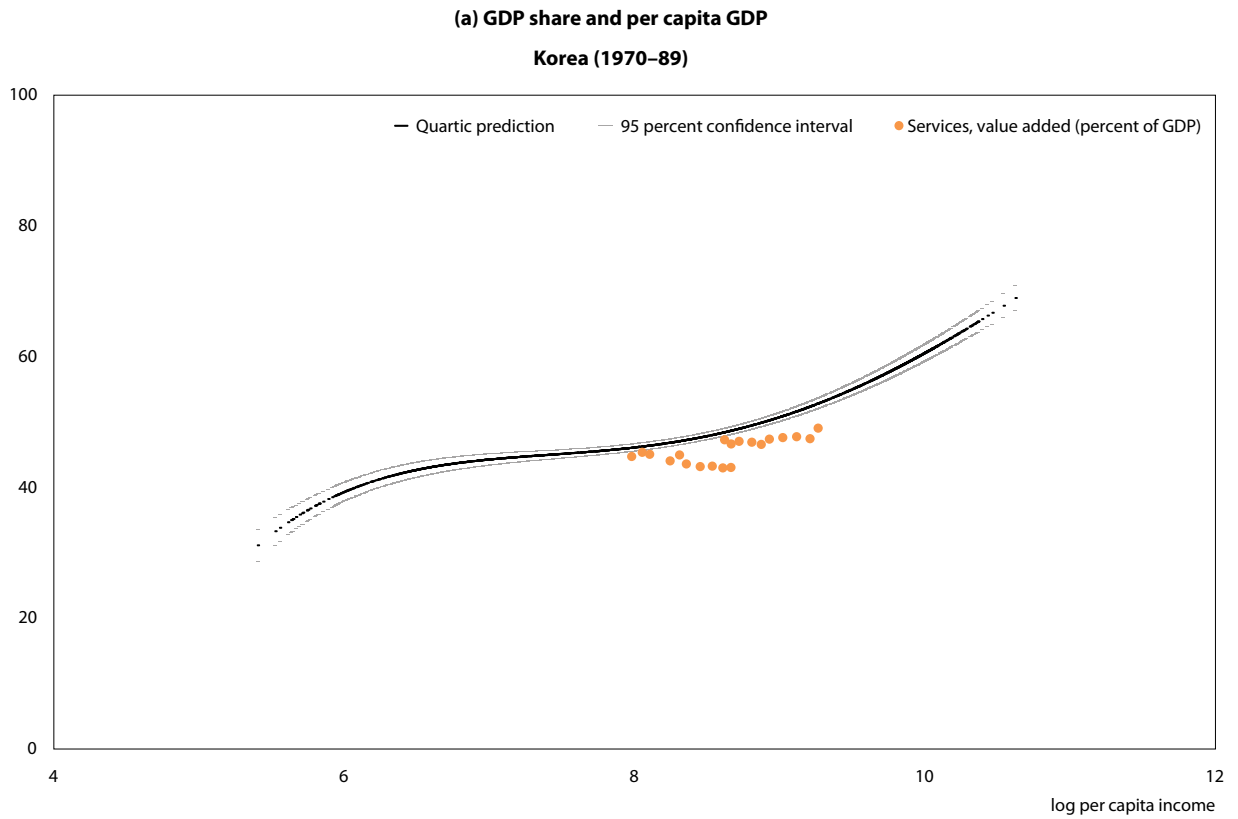
(continues)

Figure 1   Service sector GDP and employment shares and per capita GDP *(continued)*

(b) Employment share and per capita GDP

Korea (1980–89)

Korea (1990–2010)
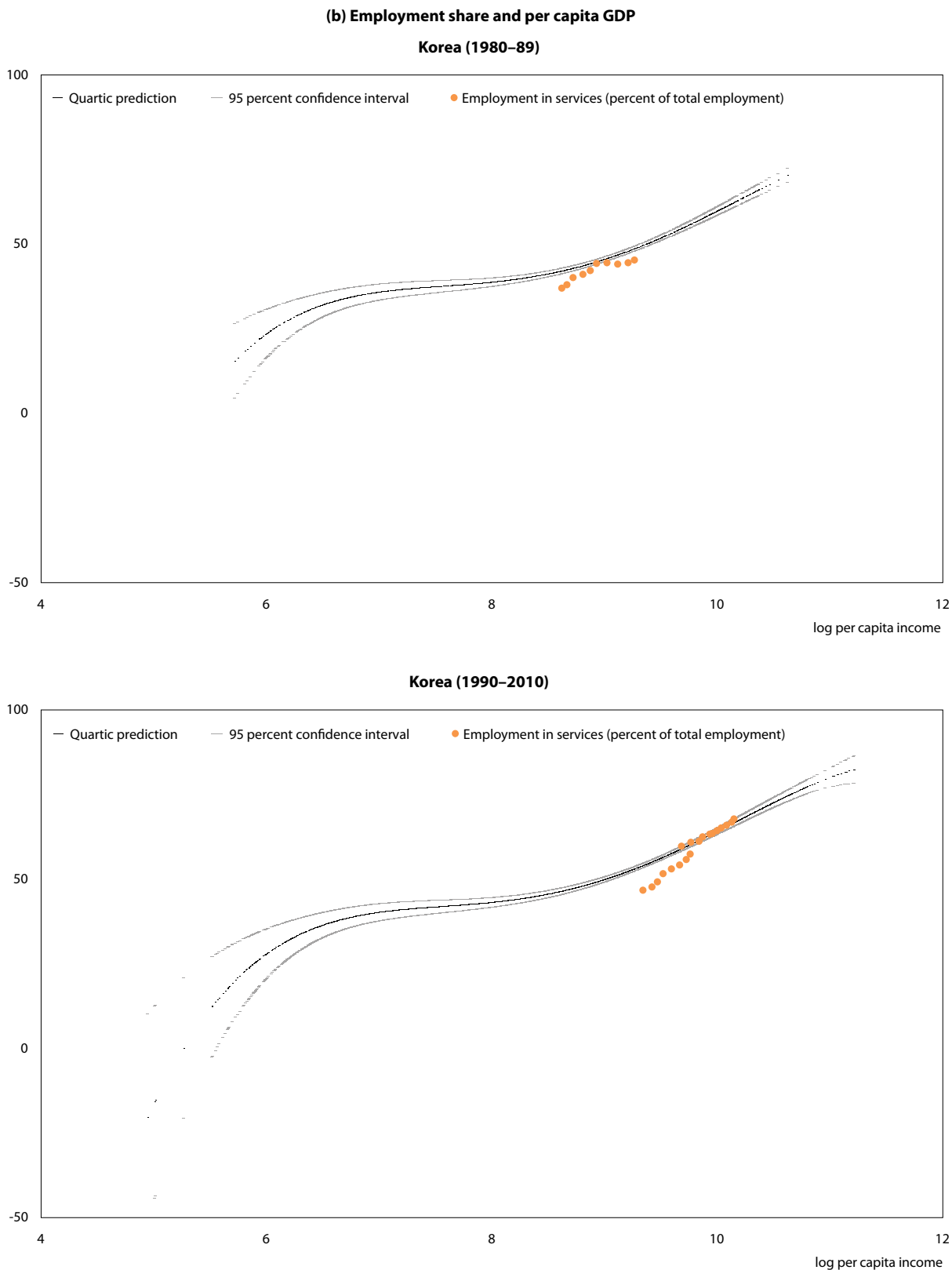
Note: The figures show the estimated relationship and 5 percent confidence intervals for two periods based on the regression in column II, table 3 (a) and column III, table 4 (b), respectively, reported in Park and Shin (2012).

Source: Park and Shin (2012).

Table 1 Output and employment shares of the service sector (percent)

Country	GDP share				Employment share			
	1980	1990	2000	2009	1980	1990	2000	2009
Twelve Asian countries								
China	21.6	31.5	39.0	43.4	13.1	18.5	27.5	–
Hong Kong, China	–	–	88.3	92.6	48.4	62.4	79.4	87.4
India	39.6	43.8	50.5	55.3	–	–	24.1	–
Indonesia	34.3	41.5	38.5	34.5	30.4	30.2	37.3	41.5
Korea, Republic of	47.3	49.5	57.3	61.0	37.0	46.7	61.2	67.8
Malaysia	36.3	42.6	43.1	46.2	38.7	46.5	49.5	59.5
Pakistan	45.6	48.8	50.7	54.2	26.8	28.9	33.5	35.2
Philippines	36.1	43.6	51.6	55.2	32.8	39.7	46.7	50.3
Singapore	62.3	67.8	65.4	71.6	62.6	61.7	65.5	77.1
Taiwan	45.7	55.0	66.4	68.5	38.0	46.3	55.0	58.9
Thailand	48.1	50.3	49.0	45.2	18.9	22.0	32.2	38.9
Vietnam	–	38.6	38.7	38.8	–	–	22.3	–
South American countries								
Argentina	52.4	55.9	67.4	60.7	–	67.6	76.2	75.2
Brazil	45.2	53.2	66.7	68.5	–	54.5	59.1	60.7
Chile	55.3	49.8	55.5	53.9	59.8	55.5	62.2	65.6
Mexico	57.4	63.7	67.8	61.3	–	46.1	55.1	62.1
Eastern Europe								
Czech Republic	–	45.0	58.0	60.5	–	–	55.3	58.3
Hungary	33.8	46.4	62.4	66.2	36.8	45.0	59.7	64.2
Developed countries								
France	63.3	68.7	74.2	79.2	56.2	64.8	69.5	74.1
Germany	56.5	61.2	68.5	72.7	–	–	63.7	69.5
United Kingdom	57.2	64.1	71.7	78.2	58.9	64.8	73.0	78.6
United States	63.6	70.1	75.4	77.4	65.7	70.7	74.3	78.6

Note: Due to the lack of data, we use data in 2008 instead of 2009 for the following countries: Hungary and United States for GDP share; and Republic of Korea, Pakistan, and United States for employment share.

Source: World Development Indicators.

Table 2 Labor productivity growth rate (percent)

Country	Industry			Service		
	1980s	1990s	2000s	1980s	1990s	2000s
Twelve Asian countries						
China	4.72	11.05	7.93	5.32	5.28	8.07
Hong Kong, China			1.67			1.88
India			2.02			5.41
Indonesia	6.74	−1.90	1.40	−6.85	−4.04	3.83
Korea, Republic of	4.79	7.09	5.74	1.65	1.43	1.57
Malaysia	0.36	3.22	2.05	0.77	1.05	2.10
Pakistan	5.09	5.88	3.54	2.85	0.02	4.39
Philippines	−2.11	−0.60	1.89	−1.68	−0.74	1.84
Singapore	2.62	5.72	5.29	4.72	4.37	0.78
Taiwan	4.59	3.98	4.95	3.83	4.01	1.23
Thailand	3.64	2.85	2.71	2.65	−0.95	0.08
Vietnam			0.73			3.10
South American countries						
Argentina	−1.80	6.10	0.75	4.05	2.34	0.72
Brazil	−0.71	0.03	−1.41	−1.98	−0.18	1.10
Chile	−0.89	4.40	−0.20	0.03	3.78	1.02
Mexico		−0.89	−0.22		1.12	−1.26
Eastern Europe						
Czech Republic		4.92	3.71		−0.24	2.14
Hungary		6.92	2.24		0.84	1.52
Developed countries						
France	2.92	1.81	0.60	1.04	1.00	−0.26
Germany		2.30	0.13		1.12	0.02
United Kingdom	1.22	3.29	0.92	0.97	1.77	0.81
United States	2.06	2.86	1.74	2.15	1.37	0.98

Source: Most data are available up to 2009 except the following countries with the most recent available year in parenthesis: China (2007), India (2005), Korea (2008), and Pakistan (2008). The data are collected from the *World Development Indicators*.

Figure 2   Relative labor productivity of the service sector
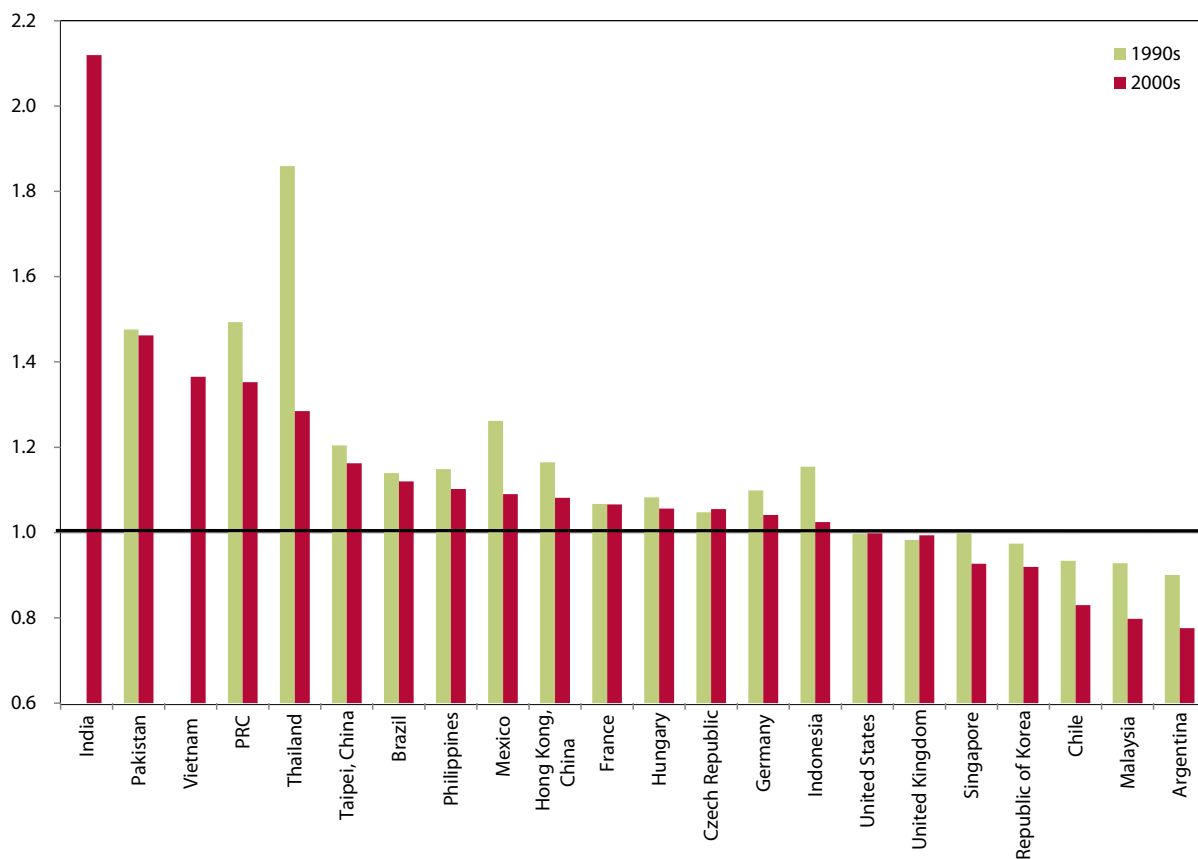
PRC = People's Republic of China

Note: Relative labor productivity of the service sector is calculated by dividing labor productivity of the sector by the aggregate labor productivity. Data are collected from *World Development Indicators*.

Source: Author estimates.

Table 3   Output and employment shares of the service subsectors in different years

(a) Output shares (percent)

	1970 US (1977)	1970 EU-15	1970 Korea	1980 US	1980 EU-15	1980 Korea	1990 US	1990 EU-15	1990 Korea	2000 US	2000 EU-15	2000 Korea	2007 US	2007 EU-15	2007 Korea
Group I	24.3	22.9	26.3	23.8	22.1	24.7	21.9	20.1	20.4	20.3	20.1	18.1	20.4	19.2	18.0
Public administration and defense	9.8	8.8	6.5	9.3	8.6	6.1	9.3	7.1	5.2	7.7	6.6	5.7	8.0	6.2	6.4
Wholesale trade	5.0	4.7	6.4	5.4	4.2	5.5	4.5	4.1	4.7	4.6	4.4	3.4	4.7	4.2	2.9
Transport and storage	3.4	5.2	5.9	3.4	5.5	6.6	2.8	5.0	4.8	2.9	5.0	4.6	2.7	4.9	4.9
Retail trade	6.1	4.1	7.6	5.7	3.8	6.6	5.3	3.9	5.6	5.1	4.1	4.4	5.1	3.9	3.8
Group II	13.8	10.9	9.5	14.2	15.1	9.2	16.9	16.1	11.8	17.8	17.7	13.3	19.2	17.8	15.3
Health and social work	4.9	3.6	1.0	5.3	5.3	1.0	7.0	5.9	2.1	7.0	6.5	2.7	8.2	6.6	3.9
Education	4.4	3.6	3.7	4.3	5.3	4.3	4.5	5.1	4.7	4.6	5.1	5.0	4.8	5.1	6.0
Other community, social, personal	2.3	2.2	2.2	2.4	2.7	2.1	3.0	3.0	2.5	3.6	3.6	2.6	3.7	3.7	2.9
Hotels and restaurants	2.2	1.6	2.5	2.3	1.7	1.8	2.5	2.0	2.5	2.5	2.4	2.9	2.6	2.4	2.6
Group III	13.4	10.0	4.0	14.6	12.8	9.0	18.8	16.1	11.5	22.6	18.3	14.2	23.0	20.5	16.9
Financial intermediation	5.0	3.8	2.1	5.4	4.7	5.8	6.5	5.5	5.8	8.4	5.0	6.9	8.7	5.9	8.7
Post and telecommunication	3.4	2.1	0.8	3.4	2.4	1.4	3.2	2.6	2.0	3.2	2.5	2.4	2.9	2.6	2.4
Other business activities	5.0	4.0	1.0	5.7	5.7	1.8	9.1	8.0	3.7	11.0	10.8	5.0	11.5	12.0	5.8

(continues)

Table 3 Output and employment shares of the service subsectors in different years *(continued)*

(b) Employment shares (percent)

	1970			1980			1990			2000			2007		
	US (1977)	EU-15	Korea	US	EU-15	Korea	US	EU-15	Korea	US	EU-15	Korea	US	EU-15	Korea
Group I	27.7	21.4	14.1	27.8	23.5	18.7	26.5	24.3	23.9	24.9	24.1	25.7	24.4	23.6	23.3
Public administration and defense	10.5	6.0	1.7	10.5	7.1	2.1	9.4	7.4	2.9	8.1	7.0	3.6	8.2	6.5	3.4
Wholesale trade	4.3	3.7	4.0	4.5	4.2	5.6	4.3	4.5	7.3	3.9	4.4	7.4	3.8	4.3	6.2
Transport and storage	3.5	4.2	3.5	3.4	4.3	4.0	2.9	4.2	4.6	3.0	4.2	5.1	3.0	4.3	5.2
Retail trade	9.3	7.6	4.8	9.5	8.0	7.0	10.0	8.2	9.2	9.8	8.5	9.7	9.5	8.5	8.5
Group II	24.8	14.5	14.7	25.0	18.2	13.8	28.1	21.6	15.5	30.4	24.8	22.7	33.3	26.5	27.0
Health and social work	6.9	4.7	0.9	7.2	6.4	1.0	9.0	7.8	1.5	10.1	9.2	2.0	11.4	9.9	3.2
Education	7.7	4.2	3.1	7.3	5.6	3.4	7.3	6.1	5.1	7.8	6.5	5.6	8.5	6.7	7.2
Other community, social, personal	4.7	2.6	3.2	4.6	3.1	3.5	5.1	3.8	4.4	5.5	4.6	5.9	5.8	4.9	7.9
Hotels and restaurants	5.6	2.9	7.4	5.9	3.1	6.0	6.7	3.8	4.5	7.0	4.5	9.1	7.6	5.1	8.7
Group III	11.4	7.1	2.4	12.4	8.9	2.7	16.1	12.1	5.1	18.5	15.4	9.3	19.3	16.9	12.6
Financial intermediation	3.8	2.0	1.6	4.0	2.7	1.4	4.3	3.1	2.4	4.2	3.0	3.6	4.2	2.9	3.5
Post and telecommunication	2.1	1.6	0.4	2.1	1.7	0.5	1.9	1.7	0.5	1.9	1.5	0.9	1.6	1.4	1.2
Other business activities	5.5	3.6	0.3	6.3	4.5	0.8	9.9	7.2	2.2	12.4	10.9	4.8	13.5	12.6	7.9

Note: Group classifications for the service sector follow Eichengreen and Gupta (2009). Due to lack of data, US data are for 1977 instead of 1970.

Source: The data are collected from EU KLEMS.

Table 4 Average growth rate of productivity in different periods

(a) Total factor productivity (percent)

	EU-15				United States				Korea			
	1971–80	1981–90	1991–2000	2001–07	1978–80	1981–90	1991–2000	2001–07	1978–80	1981–90	1991–2000	2001–05
Group I	0.00	1.05	0.66	0.47	–1.20	0.69	1.04	1.09	–3.72	1.87	1.23	0.87
Public administration and defense	–1.37	0.09	–0.20	–0.15	–1.95	–0.51	–1.56	–0.13	–1.38	–3.22	–1.69	0.23
Wholesale trade	–0.31	0.71	0.92	1.11	–0.70	1.19	4.76	1.28	–8.77	4.71	2.21	0.42
Transport and storage	1.12	1.87	0.98	0.02	1.15	2.15	0.86	2.01	1.46	1.60	2.16	1.95
Retail trade	0.59	1.68	0.88	0.79	–1.81	1.47	2.16	2.40	–6.00	2.68	3.72	1.05
Group II	0.13	–0.52	–0.52	–0.97	0.01	–0.87	–1.11	–0.12	–1.27	2.56	–0.37	–2.21
Health and social work	0.34	–0.30	–0.14	–0.59	0.43	–2.28	–2.13	–0.13	3.67	7.01	–1.79	–4.04
Education	0.46	0.29	–0.45	–1.08	–0.23	–1.59	–1.09	–1.64	–2.34	–1.68	0.23	–1.62
Other community, social, personal	–0.06	–1.87	–1.36	–1.36	0.49	2.43	0.07	1.84	4.29	2.85	2.28	–2.20
Hotels and restaurants	–0.50	–1.27	–0.79	–0.93	–1.10	0.37	0.22	–0.05	–6.68	8.13	–2.67	–1.35
Group III	–0.28	–0.04	0.03	0.94	0.43	–1.90	–1.20	1.37	2.38	3.70	0.35	3.09
Financial intermediation	0.06	0.62	0.78	2.25	–2.68	–4.20	–0.62	1.37	5.61	4.74	0.57	5.65
Post and telecommunication	1.37	2.45	3.50	3.72	4.66	–0.58	–0.21	4.47	6.75	7.10	11.94	7.33
Other business activities	–0.87	–1.62	–1.57	–0.61	0.79	–0.62	–2.02	0.54	–8.81	0.33	–4.88	–3.34

(continues)

Table 4 Average growth rate of productivity in different periods *(continued)*

(b) Labor productivity (percent)

	EU-15				United States				Korea			
	1971–80	1981–90	1991–2000	2001–07	1978–80	1981–90	1991–2000	2001–07	1971–80	1981–90	1991–2000	2001–07
Group I (weighted total)	1.38	1.40	1.89	1.03	–0.73	1.64	2.54	2.27	0.00	1.32	1.99	2.06
Public administration and defense	0.64	0.68	1.07	1.04	–1.40	0.93	–0.19	0.68	–2.97	–3.12	–0.51	1.62
Wholesale trade	1.00	1.06	2.98	1.50	1.22	2.93	6.62	2.95	1.17	4.20	2.61	2.93
Transport and storage	2.78	2.57	2.81	0.94	1.84	2.40	2.32	2.87	7.15	3.18	3.45	2.04
Retail trade	1.85	1.91	1.00	0.48	–2.11	1.60	3.01	3.08	0.99	3.96	3.05	1.96
Group II (weighted total)	0.63	–0.42	0.08	–0.39	0.21	–0.52	–0.51	0.62	1.71	1.99	–0.30	–1.19
Health and social work	0.46	–0.56	0.42	0.63	0.53	–1.57	–1.47	1.05	4.40	7.65	–0.57	–4.27
Education	0.65	0.17	0.17	–0.90	0.61	–0.57	–0.47	–0.95	0.38	–1.92	–0.06	–2.09
Other community, social, personal	1.07	–0.31	–0.40	–0.91	1.02	1.95	0.76	1.84	2.81	3.01	2.08	–0.76
Hotels and restaurants	0.43	–1.60	–0.51	–1.78	–2.76	0.09	0.59	0.35	3.31	7.54	–2.80	1.85
Group III (weighted total)	1.35	0.71	1.62	1.77	2.22	0.24	1.79	3.07	10.86	5.13	2.77	2.91
Financial intermediation	0.14	1.10	2.06	2.27	1.67	0.26	2.91	2.58	16.49	5.85	2.44	5.54
Post and telecommunication	3.28	3.76	7.44	5.36	6.22	1.01	2.93	6.45	13.49	10.46	12.09	5.58
Other business activities	1.87	–0.39	–0.45	0.05	0.79	–0.18	0.51	2.25	2.77	2.35	–1.40	–4.88

Note: Group I, II, and III values are weighted averages with the individual industry's value added used as weights. Due to data availability, the period covered for EU-15 countries is indicated in parenthesis as follows: Austria (1981–2007), Belgium (1981–2006), Denmark (1981–2007), Spain (1981–2007), Finland (1971–2007), France (1981–2007), Germany (1992–2007), Greece (Not Available), Ireland (1989–2007), Italy (1971–2007), Luxembourg (Not Available), Netherlands (1980–2007), Portugal (Not Available), Sweden (1994–2007), and United Kingdom (1971–2007).

Source: The data are collected from EU KLEMS.

Table 5　Integrated PMR indicator

	China	India	Indonesia	Japan	Korea	OECD average
Product market regulation	**3.30**	**2.84**	**2.73**	**1.14**	**1.48**	**1.36**
State control	**4.63**	**3.58**	**4.36**	**1.43**	**1.99**	**2.04**
1. Public ownership	**5.33**	**4.00**	**5.10**	**2.01**	**2.76**	**2.93**
Scope of public enterprise sector	6.00	4.91	5.73	2.00	1.75	3.08
Government involvement in infrastructure sector	5.48	4.65	4.83	1.18	2.65	3.30
Direct control over business enterprise	4.50	2.45	4.74	2.85	3.88	3.20
2. Involvement in business operation	**3.94**	**3.15**	**3.63**	**0.85**	**1.22**	**2.42**
Price controls	4.38	1.13	3.00	1.40	1.78	2.64
Use of command and control regulation	3.50	5.18	4.25	0.31	0.67	2.53
Barriers to entrepreneurship	**2.89**	**2.73**	**1.86**	**1.37**	**1.14**	**1.42**
1. Regulatory and administrative opacity	**0.25**	**2.01**	**0.16**	**1.13**	**0.00**	**1.55**
License and permits system	0.00	2.00	0.00	2.00	0.00	1.87
Communication and simplification of rules and procedures	0.50	2.02	0.32	0.25	0.00	0.91
2. Administrative burdens on startups	**5.58**	**4.44**	**1.64**	**0.74**	**1.57**	**1.68**
Administrative burdens for corporation	5.25	4.50	1.00	1.75	2.75	1.36
Administrative burdens for sole proprietor firms	5.50	5.50	2.25	0.00	0.75	1.53
Sector specific administrative burdens	6.00	3.33	1.67	0.46	1.21	1.55
3. Barriers to competition	**2.83**	**1.74**	**3.79**	**2.24**	**1.85**	**1.77**
Legal barriers	1.43	0.86	4.57	1.43	1.14	1.52
Antitrust exemptions	0.00	1.23	2.86	0.50	0.44	1.37
Barrier to entry in network sectors	5.39	3.56	3.92	3.68	3.52	1.57
Barrier to entry in services	4.50	1.33	0.00	3.36	2.31	1.76
Barriers to trade and investment	**2.40**	**2.22**	**1.97**	**0.62**	**1.30**	**0.63**
1. Explicit barriers to trade and investment	**2.52**	**2.84**	**2.33**	**1.24**	**1.00**	**1.08**
Barriers to FDI	3.36	2.52	2.88	1.48	1.01	1.34
Tariffs	2.00	4.00	1.00	0.00	2.00	1.31
Discriminatory procedures	2.21	2.00	3.13	2.25	0.00	1.08
2. Other barriers	**2.27**	**1.60**	**1.60**	**0.00**	**1.60**	**0.79**
Regulatory barriers	2.27	1.60	1.60	0.00	1.60	0.87

PMR = Product market regulation; OECD = Organization for Economic Cooperation and Development; FDI = Foreign Direct Investment

Source: The data are obtained from *Indicators of Product Market Regulation Database*, OECD, referring to the beginning of 2008.

Figure 3   R&D intensity of service subsectors

(a) Group I
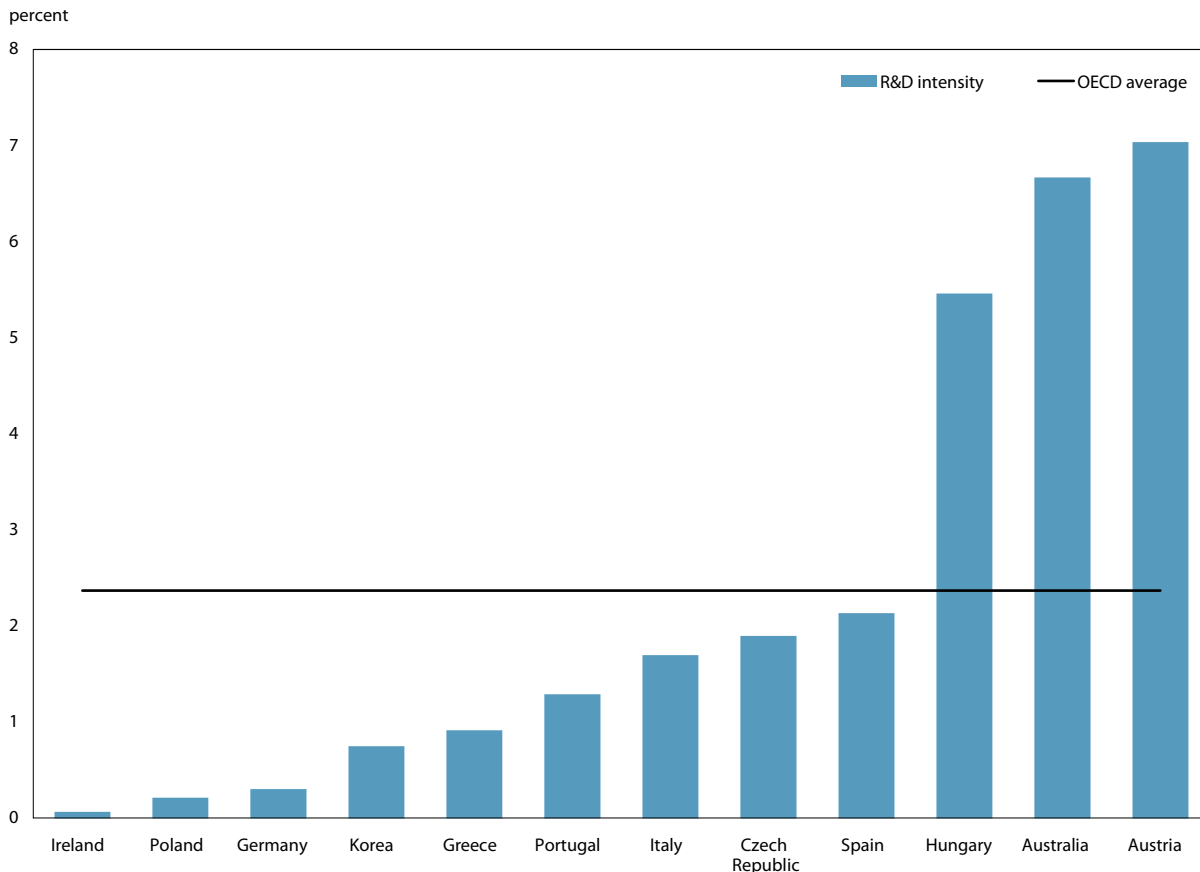
percent
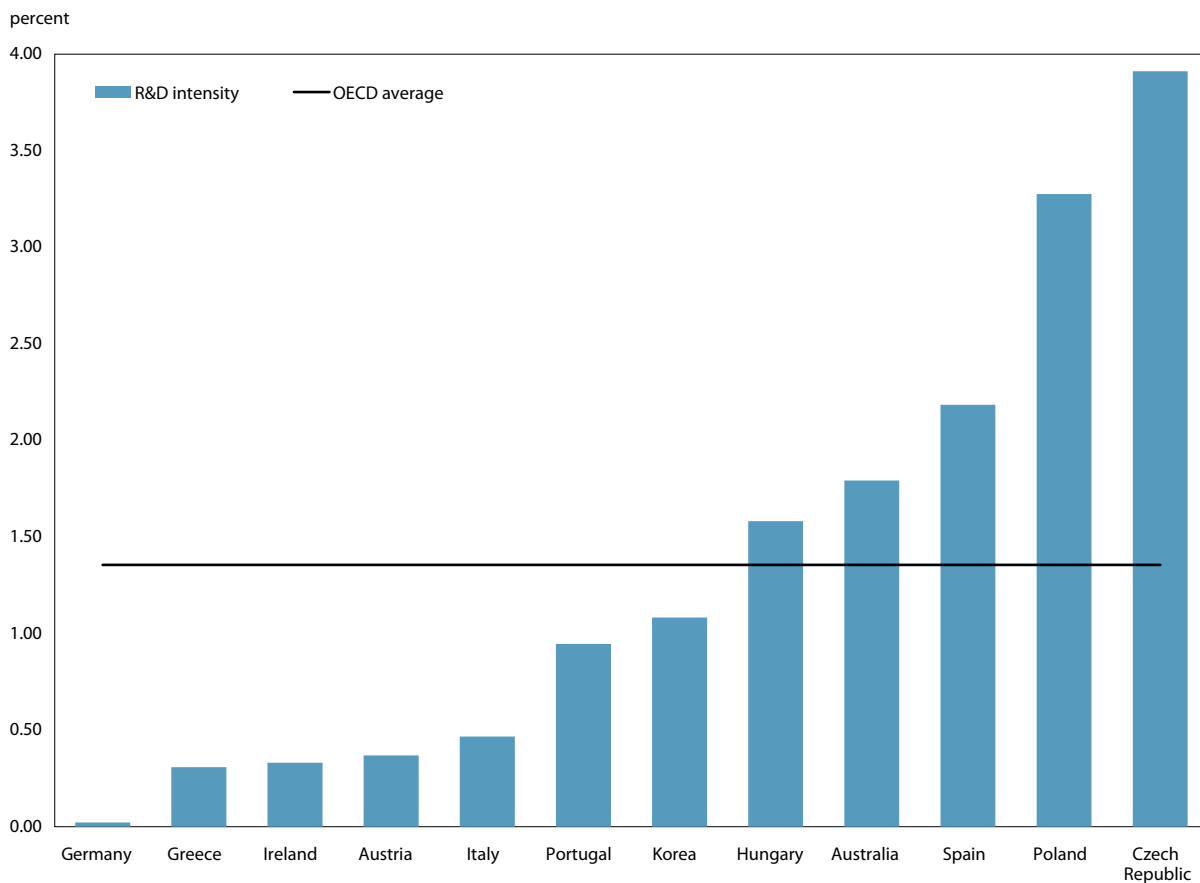
(b) Group II

percent

(continues)

Figure 3   R&D intensity of service subsectors *(continued)*
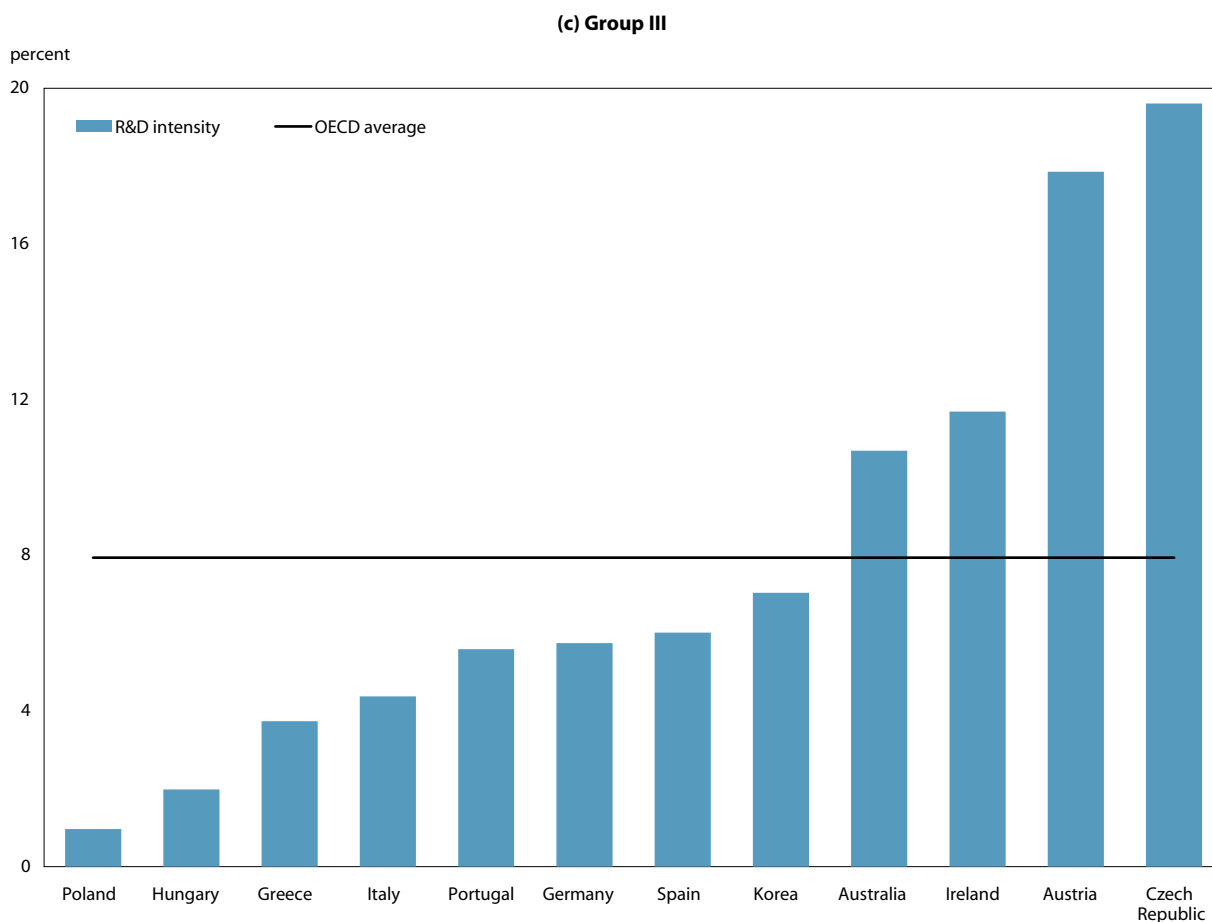
(c) Group III

percent

R&D = research and development

Note: R&D intensity is measured as R&D expenditures as a percentage of value added in each group: I, II, and III. Group classifications for the service sector follow Eichengreen and Gupta (2009). Group I includes "wholesale and retail trade," group II includes "hotels and restaurants" and "community, social, and personal services," and group III includes "financial intermediation" and "real estate, renting, and business activities." R&D expenditure data are collected from OECD STAN Indicators and value added are from EU KLEMS. The data are for the most recent year available as follows: Poland (2005), Greece (2005), Portugal (2005), Hungary (2006), Ireland (2005), Czech Republic (2007), Spain (2006), Italy (2007), Australia (2004), Austria (2006), Germany (2006), Korea (2006).

Source: OECD STAN Indicators and EU KLEMS.

Table 6   Service trade shares in total trade (percent)

Countries	Service exports/total exports			Service imports/total imports		
	1990	2000	2010	1990	2000	2010
Twelve Asian countries						
China	10.2	10.9	9.8	9.3	14.4	12.7
Hong Kong, China		16.6	21.2		10.5	10.4
India	20.2	27.8	35.5	20.6	26.3	26.6
Indonesia	8.5	7.4	9.6	22.0	27.9	16.9
Korea, Republic of	13.6	15.0	15.1	13.5	17.4	18.2
Malaysia	11.8	12.4	14.1	17.3	17.8	17.0
Pakistan	20.9	13.6	23.0	20.3	18.5	17.7
Philippines	28.4	8.3	22.1	12.6	10.8	15.6
Singapore	19.0	15.8	23.8	13.3	17.8	23.6
Taiwan	9.4	11.6	12.8	20.3	15.4	12.9
Thailand	22.0	17.0	14.9	17.6	21.6	22.2
Vietnam		15.8	9.4		18.8	11.4
South American countries						
Argentina	16.5	15.8	16.2	45.6	27.8	20.7
Brazil	10.7	14.7	13.6	26.7	23.0	25.7
Chile	18.1	17.5	13.2	22.7	21.9	17.6
Mexico	16.6	7.5	4.8	19.9	8.8	7.7
Eastern Europe						
Czech Republic		19.1	15.2		14.5	13.0
Hungary	24.0	17.0	17.5	21.8	13.1	15.1
Developed countries						
France	26.8	21.8	21.9	21.6	17.9	18.3
Germany	13.2	13.2	15.5	19.7	21.9	19.3
United Kingdom	23.6	29.6	36.8	18.5	23.0	23.1
United States	27.3	26.6	29.6	19.0	15.0	17.2

Source: Data are collected from *World Development Indicators*.

Table 7   Trade and trade balance, 2010 (billions of US dollars)

	(a) Manufacturing trade						
Country	Export	Rank	Trade balance	Country	Import	Rank	Trade balance
Top 10 countries							
China	1478.1	1	617.8	United States	1382.3	1	−536.3
Germany	1044.2	2	318.9	China	860.3	2	617.8
United States	846.0	3	−536.3	Germany	725.4	3	318.9
Japan	685.3	4	334.2	France	444.2	4	−35.5
Korea, Republic of	414.8	5	173.3	Hong Kong, China	397.1	5	−89.3
France	408.6	6	−35.5	United Kingdom	382.8	6	−98.0
Italy	368.1	7	61.7	Japan	351.1	7	334.2
Netherlands	326.1	8	29.3	Canada	308.5	8	−118.2
Belgium	309.2	9	33.0	Italy	306.4	9	61.7
Hong Kong, China	307.8	10	−89.3	Netherlands	296.8	10	29.3
Other countries							
United Kingdom	284.8	11	−98.0	Mexico	247.3	12	−20.7
Singapore	257.4	12	53.1	Korea, Republic of	241.5	13	173.3
Mexico	226.5	13	−20.7	Singapore	204.3	15	53.1
Thailand	146.9	17	19.5	India	169.4	17	−29.2
India	140.3	18	−29.2	Brazil	141.3	20	−66.5
Malaysia	133.7	19	11.2	Thailand	127.4	22	19.5
Czech Republic	115.0	23	18.0	Malaysia	122.5	23	11.2
Hungary	78.1	26	14.9	Czech Republic	97.0	27	18.0
Brazil	74.9	27	−66.5	Indonesia	85.2	28	−25.9
Indonesia	59.2	28	−25.9	Hungary	63.2	30	14.9
Philippines	44.2	34	5.0	Argentina	48.1	36	−25.5
Argentina	22.6	43	−25.5	Chile	40.7	41	−31.7
Pakistan	15.9	44	−3.1	Philippines	39.2	43	5.0
Chile	9.0	54	−31.7	Pakistan	18.9	56	−3.1

(continues)

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Table 7   Trade and trade balance, 2010 (billions of US dollars) *(continued)*

(b) Service trade							
Country	Export	Rank	Trade balance	Country	Import	Rank	Trade balance
Top 10 countries							
United States	544	1	142.0	United States	402.0	1	142.0
United Kingdom	239	2	70.0	Germany	263.0	2	−25.0
Germany	238	3	−25.0	China	193.0	3	−22.0
China	171	4	−22.0	United Kingdom	169.0	4	70.0
France	145	5	13.0	Japan	158.0	5	−17.0
Japan	141	6	−17.0	France	132.0	6	13.0
India	124	7	36.9	India	117.0	7	7.0
Spain	124	7	7.0	Italy	111.0	8	−12.3
Singapore	112	9	15.5	Ireland	107.0	9	−9.2
Hong Kong, China	106	10	55.1	Singapore	96.5	10	15.5
Other countries							
Korea, Republic of	82.7	15	−11.2	Korea, Republic of	93.9	11	−11.2
Thailand	34.0	27	−11.8	Brazil	62.6	18	−30.8
Brazil	31.8	29	−30.8	Hong Kong , China	50.9	21	55.1
Czech Republic	21.7	33	3.4	Thailand	45.9	23	−11.8
Hungary	19.1	34	3.2	Indonesia	26.1	29	−9.3
Indonesia	16.8	36	−9.3	Mexico	25.6	30	−10.2
Mexico	15.4	37	−10.2	Czech Republic	18.2	36	3.4
Philippines	13.2	40	1.9	Hungary	15.9	38	3.2
Argentina	13.2	41	−0.9	Argentina	14.1	40	−0.9
Chile	10.8	45		Chile	11.8	44	
Vietnam	7.5	50	−2.5	Philippines	11.3	46	1.9
Pakistan	6.4	52	−0.7	Vietnam	9.9	48	−2.5
				Pakistan	7.1	53	−0.7

Source: The data are collected from *World Development Indicators*.

Table 8 Gravity equation for total exports and imports

Dependent variable	I Total exports	II Total imports	III Total exports	IV Total imports
Dummy for Korea			1.112***	0.909***
			[6.076]	[3.225]
Log distance	−1.096***	−1.033***	−1.108***	−1.043***
	[−35.820]	[−21.857]	[−36.422]	[−22.104]
Log population 1	1.074***	1.128***	1.059***	1.116***
	[59.605]	[40.551]	[58.598]	[39.837]
Log population 2	0.830***	1.095***	0.817***	1.084***
	[47.777]	[40.857]	[47.043]	[40.299]
Log per capita GDP 1	1.554***	0.785***	1.570***	0.801***
	[35.452]	[10.921]	[35.867]	[11.140]
Log per capita GDP 2	1.144***	1.281***	1.133***	1.272***
	[70.366]	[49.634]	[69.711]	[49.162]
Dummy for currency union	0.057	0.280**	0.069	0.291**
	[0.669]	[2.085]	[0.819]	[2.173]
Dummy for common language	0.840***	0.576***	0.791***	0.535***
	[10.445]	[4.668]	[9.867]	[4.338]
Dummy for regional trade agreement	0.058***	0.076**	0.062***	0.080**
	[2.972]	[2.280]	[3.164]	[2.393]
Dummy for land border	0.279**	0.633***	0.289**	0.642***
	[2.032]	[3.015]	[2.130]	[3.070]
Number of islands	0.101*	0.665***	0.114*	0.675***
	[1.691]	[7.220]	[1.928]	[7.361]
Log product of land areas	0.012	0.021	0.019	0.027
	[0.991]	[1.160]	[1.622]	[1.501]
Dummy for common colonizer	1.651***	1.900***	1.628***	1.884***
	[5.600]	[4.199]	[5.570]	[4.181]
Dummy for current colonial relationship	0.719	0.689	0.747	0.711
	[0.889]	[0.553]	[0.931]	[0.574]
Dummy for pairs ever in colonial relationship	0.350***	0.781***	0.405***	0.825***
	[2.979]	[4.332]	[3.463]	[4.587]
Observations	17,677	17,677	17,677	17,677
R-squared	0.425	0.154	0.425	0.154

Note: T statistics are in parentheses. *, **, *** indicate that the coefficient is significant at 10, 5, and 1 percent levels respectively. Population 1 (2) refers to export (import) country's population in the export (import) equations, column1 (2) and column 3 (4). The same is true for GDP 1 and 2.

Source: Distance is collected from CEPII, population and per capita GDP from Penn World 7.0, regional trade agreement from ROSE, CEPII, and the World Trade Organization (WTO).

Table 9 Gravity equation for service exports and imports

Dependent variable	I	II	III	IV
	Service exports	Service imports	Service exports	Service imports
Dummy for Korea			0.868***	0.879***
			[4.230]	[4.504]
Log distance	−0.733***	−0.796***	−0.742***	−0.805***
	[−21.021]	[−24.075]	[−21.384]	[−24.478]
Log population 1	0.912***	0.961***	0.899***	0.948***
	[44.531]	[49.445]	[43.710]	[48.617]
Log population 2	0.713***	0.735***	0.702***	0.724***
	[36.280]	[39.357]	[35.648]	[38.748]
Log per capita GDP 1	2.805***	2.533***	2.818***	2.545***
	[49.123]	[47.714]	[49.432]	[48.036]
Log per capita GDP 2	1.222***	1.111***	1.211***	1.100***
	[62.381]	[60.214]	[61.757]	[59.633]
Dummy for currency union	0.387***	0.378***	0.400***	0.392***
	[3.806]	[3.945]	[3.955]	[4.109]
Dummy for common language	1.121***	1.060***	1.082***	1.021***
	[12.469]	[12.385]	[12.062]	[11.964]
Dummy for regional trade agreement	0.073**	0.046*	0.078***	0.052**
	[2.539]	[1.778]	[2.717]	[1.982]
Dummy for land border	0.530***	0.535***	0.540***	0.544***
	[3.467]	[3.673]	[3.556]	[3.767]
Number of islands	0.085	0.427***	0.097	0.439***
	[1.260]	[6.663]	[1.448]	[6.895]
Log product of land areas	−0.037***	−0.070***	−0.031**	−0.064***
	[−2.809]	[−5.575]	[−2.327]	[−5.091]
Dummy for common colonizer	2.375***	2.212***	2.355***	2.193***
	[7.186]	[7.038]	[7.177]	[7.032]
Dummy for current colonial relationship	2.102**	2.631***	2.128**	2.656***
	[2.296]	[3.027]	[2.340]	[3.079]
Dummy for pairs ever in colonial relationship	0.745***	0.545***	0.786***	0.588***
	[5.673]	[4.364]	[6.015]	[4.727]
Observations	17,677	17,674	17,677	17,674
R-squared	0.433	0.384	0.433	0.384

Source: Author estimates.