

# Job retention opportunities in a pandemic crisis based on the example of three countries in the Asia-Pacific region

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## ABSTRACT

Our study examines the development of unemployment data from three strong Asian economies, China, Korea, and Japan. The focus is on the impact of the economic crisis caused by COVID-19, as well as an overview of the possible solutions to combat the impact of similar future crises on the labour market, in the hope of mitigating future economic dislocations. Following an overview of the region's economy and the pandemic, we use stochastic modelling of unemployment data of ten years prior to the pandemic, to estimate counterfactual future data without the pandemic. We then compare this estimate with real data during the pandemic. We did this in order to explore ideas and new solutions that could possibly be applied in Hungary, which is presently burdened by a very significant labour shortage.

## KEYWORDS

Asia-Pacific region, unemployment, COVID-19, ARIMA, integration

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## 1. INTRODUCTION

This study concentrates on the three major economies of the Asia-Pacific region, China, Japan, and South Korea. Our research question is whether there are any similarities or differences in labour dynamics in these countries, in reaction to serious international dislocations impacting the region. The topicality of the study is due to an exploration of the spill-over effects of the global economic downturn due to COVID-19. Although some countries (China) have reported a recovery to pre-pandemic levels, others are still struggling with the aftermath of the virus. COVID-19 threatens the workforce, i.e., human resources, and initially only lockdown measures helped to mitigate the spread of the virus. Therefore, many jobs had to be temporarily eliminated or working hours and hence wages cut. We examine the development of the unemployment rate of the three countries during the pandemic and compare it with an estimate based on the trend of the previous ten years. This is how we show the impact of COVID-19 on the labour market.

Although this study is published in a journal focusing on East-Central Europe, we believe that due to the global nature of the pandemic and the economic crisis it has caused, it is essential to learn about and use the experiences of other regions. Therefore, in our review, we examined the results of three Asian countries. First, China, which is one of the largest players in the world economy. The pandemic started in this country, so the Chinese have the most experience. These experiences also proved to be successful, as they managed to prevent the spread of the virus, and they also produced economic growth during the general recession (Jackson 2021). Japan is also a traditionally strong economy in the world. The experience of this country is important for other countries because the Japanese government has a very narrow constitutional scope to regulate emergency situations through political means (Nishikawa 2020). Finally, the third country is South Korea, one of the emerging global economies. The country has chosen a unique strategy for the fight against the pandemic: mass testing, prompt treatment of filtered cases, cooperation and collaboration between governmental and social organizations (Moon et al. 2021). Therefore, the specific path of these three countries can be of help to other countries in the world.

We based our study on labour market statistics. We used a ten-year time series, based on which we statistically estimated the expected unemployment rate without COVID-19, and then compared our results with real data measured during the pandemic. Our results show that all three countries successfully fought against the increase in unemployment. We deduced the effectiveness of the crisis management caused by the global closures based on the differences and the knowledge gained from the literature on the given country (Scarpetta et al. 2022). Based on our findings, we focus on the generalizable experiences that can be used in other countries as well.

We start the discussion of the topic with a regional overview, and then we discuss the applied methodology. The selection of the methodology was based on the fact that we did not come across estimates applied to previous time series in the reviewed pandemic literature. The methodological part is followed by the presentation and discussion of the results. In the summary, we highlight the most important experiences that can be used for other countries as well.

## 2. REGIONAL INSTITUTIONAL REVIEW

Examining the countries of Asia is important, because they can be seen as the engines of global economic growth. This is partly related to the cultural dimensions of the countries, which also



determined the economic impacts of COVID-19 (Hofstede 2011). This effect is significant, for example, on the development of competitiveness (Van Den Bosch – Van Prooijen 1992). Traditionally, individualist cultures have a higher capacity for innovation, especially when low power distances are common. Individualism is more characteristic of Western cultures; Eastern societies are more collectivist. At the same time, government restrictions and austerity measures aimed at the management of the pandemic have further reduced the innovative capacity of individualist cultures (Kapoor et al. 2021). Perhaps this also contributed to the production of the first effective vaccine in collectivist China.

According to the commonly used definition of the International Labour Organization (ILO) (Insee 2021), an unemployed person meets the following three conditions:

- they did not work during the week under study because they did not have a job, however
- they are able to start working in the next two weeks, or
- have looked for or found a job in the last four weeks where they can start working within three months.

The number of people who are part of the active working age group, but for some reason do not work or look for a job (e.g. patients, householders, dependents), is wider. However, the ILO definition cannot be used in connection with a pandemic because it is unclear and can even be misleading. First, there was no opportunity to look for a job due to the lockdowns, and second, many redundant workers were waiting for their company to reopen.

Economic growth in the Asia-Pacific region declined as early as 2019, and in 2020 this decline intensified due to the spread of COVID-19. The decline in 2020 was much greater than during the 2008 crisis. The pandemic affected all countries (Sawada – Sumulong 2021), but its impact was unevenly distributed across nations. In some countries, such as the Maldives, the stagnation of tourism caused the decline. Elsewhere, such as Macau (China), the economy was stagnating. Malaysia and Thailand were even more seriously impacted, with supply chain activities and tourism coming to a halt. The cause of economic uncertainty in 2019 was geopolitical tensions and trade wars, which were further exacerbated by the pandemic in 2020 (Baker et al. 2020). Not only has the economy been affected by the crisis, but household expectations have also fallen: the consumer confidence index peaked in April 2020 (Trading Economics 2021). The lockdown in the first quarter of 2020 had a significant impact on employment. Hospitality, trade, and construction fell the most. Lockdown measures resulted in lost working hours, with the regional decline at 7.3 percent, equivalent to 125 million full time jobs. Wage workers and self-employed workers also reported job losses. In October 2020, the region reached pre-COVID unemployment. China, the largest economy in the Asia-Pacific region, was the only one in the world to produce almost 2 percent economic growth in 2020, despite the detrimental effects of COVID (BBC 2021; PWC 2021).

In Asia (APESO 2020; ASEAN 2020; Morris – Weidenkaff 2020), the pandemic significantly reduced the number of hours worked, reversed the employment growth trend, and led to the loss of 81 million jobs. South Asia was hit hardest by the downturn. It was mainly women and young workers who have lost their jobs. Half of the region's workers were employed in the sectors most affected by travel restrictions (hospitality, trade, assembly, transport, construction), and guest workers in particular have lost their jobs. In Asia, 24 percent of young workers under the age of 35 were unemployed, but that was just the average. The impact varied significantly by gender, with 13 percent unemployment for younger men and 36 percent for women. In the first quarter



of 2020, converting the number of reduced working hours into full-time equivalents, nearly 120 million jobs were lost, and this figure doubled by the end of the second quarter. According to official data of International Labour Organization, the same figure was 255 million unemployed globally in 2020 (ILO 2021).

The position of China among the countries of the region is unique (Barwick et al. 2020; Bloomberg 2020; CEIC 2021; Fernandes 2020; Morris – Weidenkaff 2020; Subbaraman – Varma 2020). As this country was the outbreak point (epicentre) of the pandemic, everything here happened earlier than in other countries. By April, the estimated national average for actual unemployment was 20.5 percent, but in industrialized countries it has often reached 65 percent. The official recovery took place as early as October 2020. Almost immediately after the outbreak, the government introduced strict restrictive measures, extended Chinese New Year, closed Hubei Province, imposed large-scale national-level mobility restrictions, introduced social distancing, and a 14-day quarantine period for returning migrant workers. These restraining measures were reflected in the 6.8 percent (year-over-year) downturn in the economy in the first quarter of 2020. As a result of immediate and strict closure provisions, China reopened its economy as early as February 2020. The rapid fall and then compensation resulted in a V-shaped economic trajectory and an overall annual gross domestic product (GDP) growth of 2.6 percent. This favourable GDP growth was also due to the fact that in 2020, inward foreign direct investment (FDI) fell worldwide by almost 40 percent, but increased by 6% to China. For Asia as a whole, FDI fell by only 25 percent in (UNCTAD 2021a; UNCTAD 2021b).

Nor should it be forgotten that in China, the labour force demand “has consistently exceeded supply for the last 10 years” (Ke – Li 2021: 1). This can be separated according to Ke and Li into two components: a “demographic gap” and an “educational gap”. The demographic gap links to an aging population, a low birth rate and a low immigration rate, and it causes labour shortage. The education gap links to low levels of skill. The Chinese government encourages vocational training programs, because only 7% of the total employed population is highly skilled and capable to adapt to quick technical changes. The first wave of COVID-19 caused a significant disruption in the Chinese labour market. Due to the reopening and growth, the demand for labour described earlier has reappeared (Kemp – Spearitt 2021).

Vaccine research was also launched immediately, resulting in a two-dose vaccine, immunizing 40 percent of the population by August 2020 (IMF 2020; 2021). In total, the government has spent nearly \$700 billion (US) on health measures, the manufacture of medical equipment, public investment, tax breaks and tackling unemployment. The central bank has implemented liquidity-enhancing measures through open market operations and base rate cuts and has offered preferential credit facilities to companies in the small-to-medium enterprise (SME) sector, for example. The amount allocated for growth loans increased by ten percentage points and the repayment term also became longer. China developed the vaccine itself, so could start its vaccination campaign earlier. By January 2021, one and a half million doses of the vaccine had already been administered. This number increased to 265 million by April (Mathieu et al. 2021).

Japan (CEIC 2021; Lai et al. 2021; Mártonffy 2021; Morris – Weidenkaff 2020) is one of the countries most affected by the pandemic. The country has chosen an individual defence method against the pandemic. This is due to a lack of a centralized constitutional authority (Saito 2020). The first case was reported by the authorities on 16 January 2020 (Schnirring 2020). The measures introduced from April 2020 were requests that the majority of the population complied with in a disciplined manner. Anyone who complied with the rules became eligible for



state aid, and those who violated them were made public (Shibuya et al. 2018). The political leadership gradually took control of the bureaucracy and also used civilian capacities. However, there is no top health body in Japan that has the legal authority to decide on the necessary measures. The bodies set up by the Prime Minister act only as advisory bodies. The relatively narrow room for manoeuvre of the parliamentary system and the government has resulted in different responses than in the case of South Korea, described later. Non-governmental organizations, e.g., called *jishuku keisatsu* (self-restraint police) monitored and enforced, if necessary, compliance with the proposed preventive closure measures (shop closure, mask wearing) at the local (city, municipal) level. Another reason for the seemingly slow initial spread of the virus is that the number of tests performed per thousand inhabitants was only 2.2, compared with 16 in South Korea or 43 in the United States (Normile 2020). The main reason for this is a frugality-based health policy: only those who had symptoms suggestive of COVID were tested (Moon et al. 2021).

Japan started its vaccination program almost last among the economically developed states, and vaccination coverage is still low (Kosaka et al. 2021). Despite the cautious approach, the Japanese data did not get significantly worse than the South Korean statistics that followed a completely different path. As a result of favourable epidemiological indicators, the government lifted the restrictions in mid-May 2020, but barely two months later, the lockdown had to be reintroduced due to a newer wave of infections. The essence of this is the 3C principle developed by the World Health Organization (WHO): avoid from closed spaces (with poor ventilation), crowded places (with many people nearby) and close-contact settings (such as close-range conversations) (WHO 2020). The cyclicity of case numbers and responses remained for the rest of the year, so New Year's Eve was also constrained. In Japan, vaccinations began as early as February 2021, but due to the slow pace, total vaccination was only 0.8 percent by the end of April and only 2 percent of the population had received full immunization (Mathieu et al. 2021).

For a long time, outside of China, the coronavirus pandemic was the most severe in South Korea, but later, effective measures slowed the spread of the pandemic rapidly. South Koreans did a lot of testing, traced contacts, and started early treatments. This was the 3T (test, trace, treat) protocol (Yilmaz – Aydin 2020). The aim was to deal with the filtered COVID positive cases as soon as possible. The success of the method was demonstrated by the fact that full recovery was achieved in 93 percent of the positive cases. In addition, detailed information on all positive coronavirus cases was immediately reported. As a result, the Asian country had a high rate of infection, but the mortality rate was extremely low. A wide range of intensive non-pharmaceutical interventions (NPIs), including tight border controls; quarantining of arriving passengers; high rates of face-mask usage, etc. (Helliwell et al. 2021: 93), have all contributed to the aforementioned favourable situation.

Twenty thousand tests a day were central to early detection, minimizing the spread of the virus and allowing rapid treatment for those who produce a positive test. It was due to this that the Korean death rate was below one (while in Italy, for example, it was above six). This helped control the pandemic, along with testing, informing the population and providing high quality health care (Benke 2020). A different model was used to deal with the pandemic than in Japan: the initial presidential leadership was later replaced by a model based on cooperation between the bureaucracy and civil society (Moon et al. 2021). The success of the Korean approach has been greatly facilitated by the fact that the country was able to put into practice the experience gained in the fight against two previous coronavirus epidemics, avian influenza in 2003 (SARS)



and Middle East Respiratory Syndrome (MERS) in 2015 (Comfort et al. 2020). The government prepared a crisis plan, the stages of which were color-coded (blue = no infection in the country, yellow = infection in the country, orange = regional spread, red = national spread) and developed appropriate measures for each stage (Dyer 2021). Close, information-sharing collaboration has developed between the government and urban-provincial governments (Moon 2020). This collaboration has also contributed to the success of open data applications such as Coronamap and Maskfinder (Lee et al. 2020). It was also due to the free flow of information that physicians had access to patients' travel data, as well as effective quarantine measures (Kim et al. 2020). Since the epidemic became national, the anti-COVID summit has met daily, with representatives of ministries and major cities agreeing on the decisions to be made (Dyer 2021), with the involvement of independent experts. From an economic point of view, the biggest result of the measures taken in the first wave was that the Korean economy did not have to be shut down for a single day and everyday life took place under normal conditions (Gallo 2020). In August, however, the situation changed. Due to violations of preventive rules, a religious community in Seoul had become the centre of an epidemic of 312 people. Due to another wave of illness, there have been several major anti-government protests in Seoul (Gallo 2020). Authorities have tightened lockdown rules to prevent the spread of the virus: they introduced stay-at-home rules, closed sporting events and nightclubs, as well as restricted a number of high-traffic jobs and limited the maximum number of people allowed in one space. All these measures have also contributed to the rise in unemployment. In September, authorities eased the tight closure due to favourable developments in epidemiological data (Associated Press 2021), followed by further easings in October (Shin 2020). From November, the number of cases rose again, and by December, Korea was hit by the third wave of the pandemic. The drastic increase in the number of cases was due to Christmas family reunions, hospital and nursing home visits, so New Year's Eve events were virtually banned. In addition, a new variant of the virus appeared in Korea by the end of the year (Associated Press 2020; Rourke 2020). Vaccinations were started by Korea at the end of February 2021, by the end of the study period, April 2021, 0.4 percent of the total population had received the dose required for full immunization and 6 percent had the first vaccinees (Mathieu et al. 2021).

As a hypothesis, we formulated the statement that due to similar geographical localisation and strong economies, we can expect similar unemployment trends as a result of the pandemic in the three countries.

### 3. DATA SOURCES AND METHODOLOGY

We examined how the pandemic affected countries' unemployment rates. Data was obtained from the OECD (Organisation for Economic Co-operation and Development) database (<https://data.oecd.org>), if the time series examined was incomplete, it was replaced from the website of Trading Economics (<https://tradingeconomics.com>). Because we often had to work with time series showing significant fluctuations and our goal was to make predictions, we did not find the deterministic method using linear trends to be sufficiently sensitive to achieve the goal. Therefore, we opted for stochastic analysis and chose the autoregressive integrated moving average (ARIMA) method, which also models random effects (Hipel 1985; Jensen 1990; Nelson 1998). The starting point for this is that the time series used are considered stationary.





These time series can be modelled by autoregressive (AR) processes, assuming that, in addition to the immediate past, random error also plays a role in the evolution of their present values. These models are classified based on the number of constants ( $p$ ) in them ( $P = 1$  - first order model,  $P = 2$  - second order model). Random effects are modelled using a moving average (MA), the order of which ( $q$ ) is also determined by the number of members in it. By applying the two models together, the role of the values and random factors of the previous periods can also be modelled. If necessary, stationary transformations (logarithmization, differentiation) can be used to filter out variability – in the appropriate degree ( $d$ ). Thus, with the help of autoregressivity, we can estimate how a given member of the time series depends on the previous member(s) in front of it, and with moving averages we were able to model the dependence of the same member on the previous period(s). Furthermore, the difference formation implemented by integrating the time series allows continuous changes not to appear in the model.

Detection of the effect of the viral situation was performed in several steps. In the first step, we determined the most optimal ARIMA (seasonal ARIMA if necessary) model based on the Akaike information criterion (AIC), which showed the most accurate fit with the monthly unemployment series from January 2010 to December 2019. Finding the optimal model also involved the necessary Box-Cox transformation. If a trend-like change could be detected in the examined period, this was also included in the model (drift). Because our primary goal was prediction, we used Ljung-Box statistics (Ljung – Box 1978), examining global fit when evaluating fitted models (Table 1). The projected monthly unemployment data was compared with the observed values to show the differences between the data estimated on the basis of the 10-year trend and the actual data due to the viral situation between January 2020 and April 2021 (Table 2). All calculations were performed using RStudio 1.3.1093.

## 4. RESULTS

This part of the study presents the development of the unemployment rate in the examined countries based on the ARIMA models. Before presenting the results, we begin this section with a brief explanation to facilitate the interpretation of Figs 1–3. The figures show several different colour coded lines and ranges. The blue line indicates the registered real unemployment data for the period between 01.01.2010 and 01.04.2020. The black line shows the values estimated by point estimation based on our model. These values would have been the expected data had it not been for the crisis caused by COVID-19. The colour coded bars show the range of the estimate for the 95% and 99.9% confidence intervals.

China's annual employment data are published by the National Bureau of Statistics in its statistical yearbook (NBSC 2021), analysed by Moody's (2021). According to the data, Moody's describes the basic characteristics of the Chinese labour market, including national and provincial labour statistics, such as the economically active population, the number of employees, staff and workers, the number of registered unemployed living in urban areas, and their annual changes. The survey method is a hierarchical reporting system, from lower-level statistical offices to higher-level statistical offices. The labour force survey is not conducted on the entire population but uses targeted sampling methods. For employment, relevant statistics are collected and compiled on the basis of administrative records (Moody's 2021). The characteristic of the method is that it considers only urban unemployment and represents the lowest values of the estimate formed from the sample. Thus, the official unemployment rate is balanced, but youth



**Table 1.** ARIMA specifications

Country	ARIMA model	Peak	AR1	AR2	AR3	AR4	MA1	MA2	MA3	SAR1	SAR2	SMA1	DRIFT	Ljung-Box Q (df)
JPN	(0,1,2) (2,0,0) +D	0.237	NA	NA	NA	NA	-0.5503 (0.0965)	-0.2789 (0.1117)	NA	-0.3674 (0.0924)	-0.3492 (0.112)	NA	-0.0095 (0.0004)	22.459 (19) P = 0.262
CHN	(1,1,0) +D	2.000	0.3757 (0.0856)	NA	NA	NA	NA	NA	NA	NA	NA	NA	-0.0233 (0.0078)	5.8224 (21) P > 0.999
KOR	(1,1,1)	-0.899	NA	NA	NA	NA	0.2980 (0.0899)	0.3022 (0.0892)	-0.4146 (0.106)	NA	NA	NA	NA	19.573 (21) P = 0.548

Source: authors.

**Table 2.** Unemployment rate in examined countries and forecasts from model

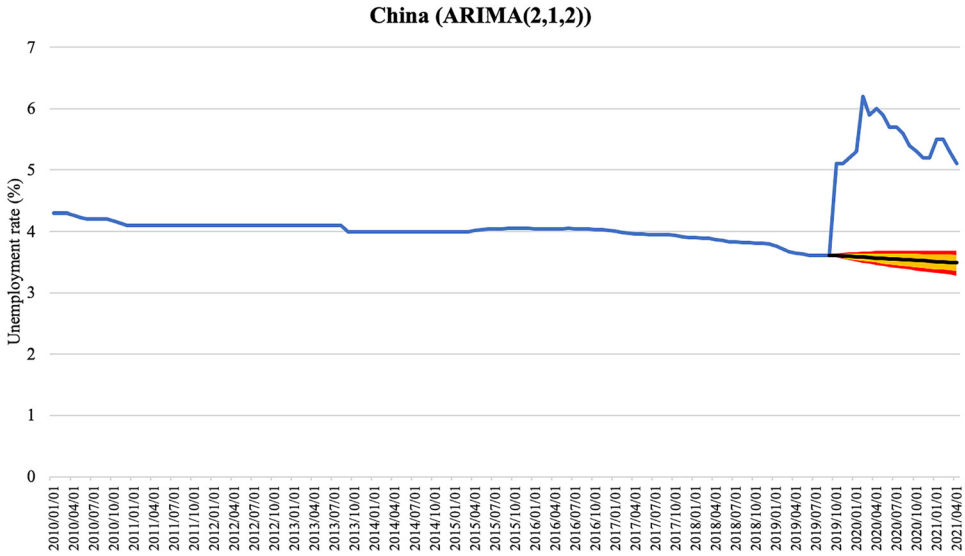
Time series	12.2019	Peak	Maximal difference	Forecast	Real	Difference	Peak vs. 12.2019	Peak vs. 04.2021	Above first	Above last	04.2021 vs. 12.2019*
Japan	2.20	10.2020	10.2020	2.04	3.10	1.06	0.90	0.30	01.2020	All	0.40
China	3.61*	02.2020	04.2020	3.58	6.20	2.62	2.59	1.10	01.2020	All	1.49
Korea (South)	3.70	01.2021	01.2021	3.65	5.40	1.75	1.70	1.75	01.2020	2021.04	0.00

\* The Chinese data are from September 2019.

Source: authors.

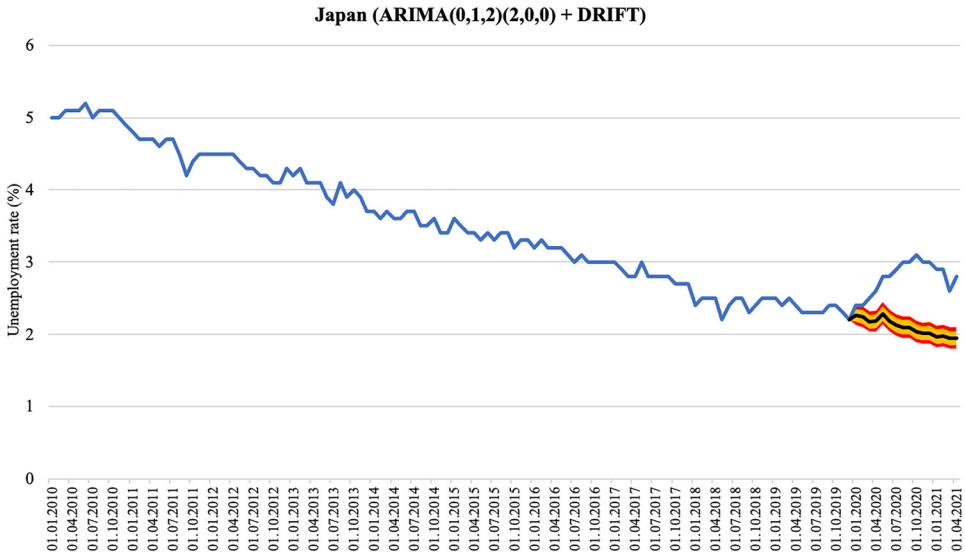






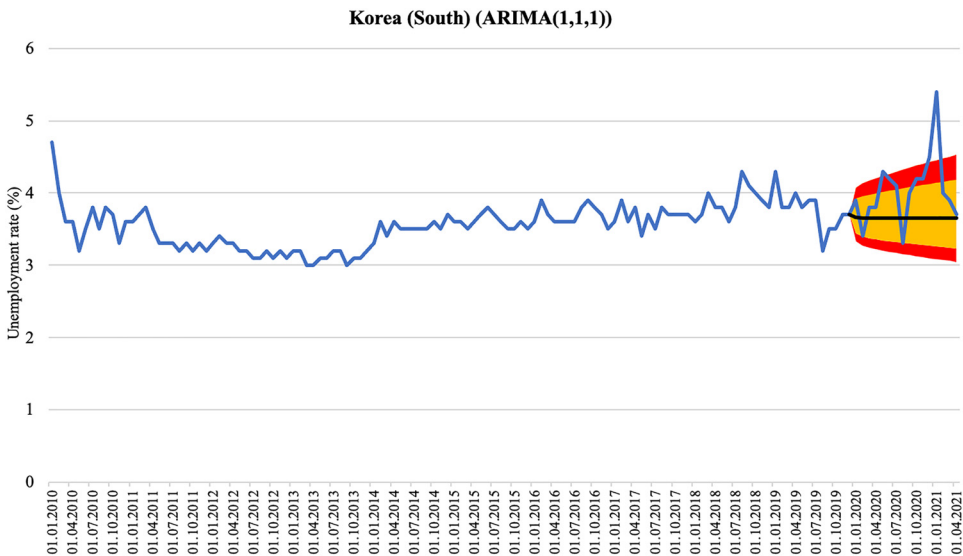
**Fig. 1. ARIMA - China**  
Source: authors.

unemployment or rural unemployment, for example, which are not included in official statistics, are much higher. In addition, many jobs are occupied by foreign guest workers (ADBI 2021), but in official statistics they also appear as jobs filled by Chinese citizens.



**Fig. 2. ARIMA - Japan**  
Source: authors.





**Fig. 3.** ARIMA – Korea

Source: authors.

The official unemployment rate rose sharply in October 2019 from 3.6 percent to 5.2 percent. However, this does not indicate hidden epidemic cases, but only a methodological change: the new methodology of the 2019 4<sup>th</sup> Economic Census resulted in a break in the data series. Thus, at the time of the outbreak, the official unemployment rate was 5.2 percent.

This peaked in March 2020, when it was 6.2 percent (Fig. 1). China's unemployment rate showed two major jumps, in October 2019 (from 3.61 to 5.10%) and February 2020 (from 5.30% to 6.20%), immediately after the pandemic. It then declined steadily until April 2021, dropping to 5.1%, which is still nearly one and a half times the pre-viral level. Given the official Chinese statistical methods, the actual unemployment rate was probably much higher than this. According to experts, even with a conservative estimate, 10.4 percent is real unemployment (Barrett 2020). In the few months after the peak, however, a correction depending on the slope of the spike, which is about a quarter to one-half, appears in the time series. That is, the sudden rise in unemployment has been managed more or less in a relatively short period of time. However, Bloomberg analysts point out (Liu – Zhu 2021) that the rapid return of unemployment to pre-pandemic levels is also statistical: unemployment between 20% and 50% among young people and those working in the service sector is not taken into account in official statistics, in these reports only factory workers are counted.

Japan's unemployment rate has been steadily declining for years before the pandemic (Yuji 2021). There are no significant differences between individual regions of the country (OECD 2020). On Okinawa, the risk of unemployment was the greatest, here in 2020 the rate of jobs at risk was 38%. The lowest risk was registered in Shiga Prefecture (31%). The number of jobs tied to secondary education decreased most significantly, with 600,000 to 900,000 jobs, employing the secondary-educated being lost in Tohoku and Tokai provinces alone. The total rate of decline was two percentage points in the decade before the pandemic. This decrease was



terminated by the coronavirus. After the outbreak, due to forced closure measures, the rate started to increase steadily from January 2020, which lasted until October 2020, when the unemployment rate peaked at 3.10%, which was 1.06 percentage points higher than the model estimate. Six million people were inactive in the labour market this month (Subbaraman – Varma 2020). The difference between the two levels is large in relative terms (50%), but much smaller in absolute terms. The indicator increased steadily from month to month, peaking in the fourth quarter of 2020, which was one percentage point higher than in December 2019 (Fig. 2).

After the peak, there was a slightly more moderate decline compared to the rise. The rate of correction was up to half a percentage point. The reason for the low unemployment data may be related to the seemingly slow increase in the number of cases, one possible explanation for which is the low testing rate, and the other is the disciplined compliance with government requests. Regarding the above-mentioned trends (non-regular workers becoming unemployed, retiring older employs or increasing female employment in traditional industries) it should be noted that the labour market situation is very uncertain due to the COVID-19 situation and it is difficult to establish an accurate picture. It is very difficult to tell whether the indicated changes are permanent or temporary (Saito 2021).

Korea's unemployment rate was more dynamic than that of Japan and China, but its rate (3.8–5%) was similar at the outbreak. Here, too, the biggest layoffs are from small retailers, restaurants and lodging (Nikkei 2020). Greater variability results in a larger confidence interval of the forecast. The more intense movement of the indicator also indicates that the Korean economy is more dependent on external influences than Japan and China. The sudden increase after the epidemic outbreak was soon offset by the low mortality rate (3T) attributable to the high testing rate, mass contact tracing and immediate treatment of positives.

Before the pandemic, 82% of the employed in Korea worked in the SME sector (OECD 2018). Many of them (90%) worked in the service sector, but here productivity was quite low. This sector then became one of the biggest losers of the pandemic due to the imposed health restrictions. Almost one third of the employees work in an atypical employment relationship. The youth unemployment rate has been decreasing and there are still significant reserves left in this age group. A characteristic of the Korean labour market is that 99.1% of the unemployed return to employment within 12 months.

The impact of the first wave on the labour market peaked in four months, by early summer, with an unemployment rate of 4.2 percent. This was an increase of 0.8 percentage points from 3.4 percent in early February, which is very close to our most pessimistic estimate modelled on the trend. Growth is higher with 0.5 percentage points more than Japanese growth over the same period, but much lower than the 2.6 percentage points of Chinese data. This suggests that Korea has successfully responded to the first wave of the epidemic. Although this increase was quickly offset, it rose to 5.4 percent by the end of 2020, the highest value in the country during the period under review. This is probably explained by the fact that mass testing and treatment has depleted Korean health care reserves, making defences against new waves of the pandemic less successful. One reason for the increase was the already mentioned August epidemic (Gallo 2020), which was further exacerbated by Christmas visits and the emergence of a new virus variant by the end of the year (Rourke 2020).

The unemployment rate in Japan (Fig. 2) has been steadily declining for years before the pandemic. Due to various measures, the unemployment rate started to increase immediately after COVID hit. The indicator grew steadily from month to month, peaking in the fourth



quarter, at 1–1.5 percentage points above the December 2019 level. After the peak, there was a slightly more moderate decline compared to the rise. The amount of the correction was at most half a percentage point, its size was adjusted to the absolute size of the rate. The growth did not exceed 1.5 percentage points anywhere. This growth rate also characterizes Korea's data during the first wave, and even the increase from January 2020 for China is no more than 1.5 percentage points. This was mainly due to the timely economic decisions of governments.

## 5. DISCUSSION

In our study, we analyzed the unemployment data of the three economically important countries of the Asia-Pacific region (China, Japan, Korea). Our aim was to investigate the relationship between COVID-19 and the development of unemployment, and to establish a forecasting method that can be used to estimate the expected development of unemployment data in the event of a crisis. For this, we used the time series of the ten years before the crisis broke out by creating an ARIMA model. An optimistic and a pessimistic scenario can also be outlined based on the estimates based on time series.

The countries studied are located on one continent, so the spread of the pandemic was similar in all three. What these countries also have in common is that their economic strength and scale can be said to be significant, therefore the increase in their unemployment rate during the first wave of COVID did not exceed 1.5 percentage points. However, this also puts an end to the similarities. Our results show that there are also significant differences between the three countries, i.e., we failed to verify our hypothesis. Every country has a characteristic that is unique to it. China's specialty for the present study is that it was the starting point for the pandemic. Therefore, it hit China most unexpectedly, which was also reflected in the sudden rapid rise in unemployment. Nevertheless, the rigor of centrally organized protection measures has proved effective, and the unemployment rate was reduced to pre-pandemic levels by the end of 2020. Korea was characterized by mass testing during the first wave. Thanks to the 3T system, the country was able to deal with the first wave of the pandemic without a major economic downturn. However, in the case of further waves, the measures were less successful, so with the spread of the pandemic, unemployment data also deteriorated. By the end of 2020, unemployment had reached an all-time high of 5.4 percent. The Japanese defence was based on a third approach. One of the pillars of this is that the country's constitutional order does not allow for the introduction of as rigorous governmental responses as in the case of China or Korea. The other pillar was much more frugal testing than the Koreans. The Japanese authorities only tested symptomatic cases. Nevertheless, the epidemiological data of the first wave was very similar to the Korean statistics. However, the key to Japan's defence was the traditional, disciplined behaviour of the population, which managed to keep the number of first-wave cases relatively low.

Examining the unemployment data of each country, we found that the real level of the unemployment rate during the pandemic in China and Japan was much higher than the value of the most pessimistic scenario estimated on the basis of the ten-year time series. This supports the contention that the economic impact of the coronavirus is indeed reflected in the unemployment data.

Reviewing the results and the literature, we can say that successful defence and successful labour market policy rest on several pillars. Ever since vaccination has been available, it has been



the main tool for epidemiological protection. Countries that created and implemented a successful vaccination campaign (China) were able to lift restrictions more quickly and restart their economies. Of course, vaccination alone is not a guarantee of success – this is well-illustrated by the example of Israel, which is not included in the present work, where the unemployment rate is high even with high vaccination ([Macrotrends 2022](#)). Prior to vaccination, social isolation and quarantine alone were the only ways for countries to avoid the escalating of the pandemic. However, such measures have only been successful in countries where the population conscientiously and voluntarily complied with them.

The best example of this is Japan. Here, even without legal coercion, South Korea's success was achieved in the first wave of the pandemic, despite the fact that there was no mass testing in Japan and the other pillars of 3T were not used. The impact of self-discipline can be clearly demonstrated, as the Japanese constitutional system does not give the government as wide a power in the hands of an emergency as in the other countries studied. In China, discipline was also the main tool in the fight. However, unlike Japan, the Chinese government also had every means to order and enforce the most stringent lockdown measures. The third path to success was with Korea's consistent application of the 3T system. However, this only successfully treated the first wave of the epidemic, and later, precisely because of a lack of discipline, the population itself contributed to the spread of the infection.

Tackling unemployment has, of course, included the policy measures that governments have taken to protect jobs. These were typically economic rescue packages, with varying amounts relative to GDP. However, their use is more important than their amount. Countries that have spent much of their rescue package on rescuing jobs, creating jobs, investing, and developing infrastructure can count on faster recovery. Each of the countries we examined fall into this group. Those who typically spent the amount on social benefits and assistance did not sufficiently motivate workers to take up employment, so they faced longer and more problematic economic recoveries.

## 6. CONCLUSION

We examined three Asian economic powers. It widely held that Europe and the three countries examined (South Korea, China, Japan) have learned from the 2008 crisis. Governments provided significant financial support to keep jobs ([Kamal-Chaoui – Allain-Dupré 2021](#)). At the same time, China has solved the health and lockdown issues in a rather efficiency-centric way. This solution can be seen in the performance of the Chinese economy. South Korea solved the issues in a more liberal way than China ([Austermann et al. 2020](#)). Experience has shown that an economic crisis due to a similar future pandemic can be prepared for in two stages. As a first step, the widest possible testing with disciplined compliance with lockdown measures can screen and isolate sick workers while eliminating the need for general economic downtime and large-scale job closures. South Korea followed this path. It successfully fought the first wave of the epidemic. This points to the need for discipline. However, due to the lack of it, Korea did not survive the second wave with similar favourable data as the first wave. At the same time, the example of Japan shows that discipline, even without extensive testing and inoculation, can work. This finding is perhaps the most important experience of our article, since disciplined behaviour can be achieved even in the absence of financial resources. However, it will only be effective if this discipline comes from within. This attitude of self-restraint characterizes Japanese culture and morality, and we think other nations can learn from this.



In the second step, discipline and screening are accompanied by achieving the fastest and most complete vaccination of the population, because to the best of our knowledge, this is the only effective way to prevent pandemics in the long run. At the same time, expecting a solution only from vaccination is not a good idea, as was proven by the example of Israel, which is not included in this study. Even though this country became one of the world leaders and became a model state for widespread vaccination, the unemployment rate became higher subsequently than it had been before pandemics (Macrotrends 2022).

It is the combination of (1) effectively enforced social discipline to reduce contacts in combination with (2) sophisticated, accurate tracing of infectious progress and (3) timely and efficacious development of vaccinations that has an impact on employment results. Given that each of the countries studied was particularly effective in different areas, sharing experiences and integrating methods may be the fastest and most successful way to deal with future crises.

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