

## **Reaction Of Economic Sectors Under Risky Conditions**

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**Abstract:** Choosing a field of activity for both employees and employers is an important issue, especially in economic conditions with many risks and uncertainties. There are fields that are very sensitive to risk factors, but there are also fields that are more resilient to unforeseen fluctuations in the surrounding environment. Choosing the right field to operate can reduce the impact of risks. Using data from the Vietnam White Book from 2017 to 2022, the article analyzes the fluctuations in employment opportunities and income of occupations when risks occur. The results show that fluctuations in employment and income in the industrial sector, especially medium and high technology, will be less affected by risks. The service sector is more sensitive to risks, but working in Finance, banking and insurance activities or Health and social assistance will reduce the impact of risks.

**Keywords:** Average income, labors, economic sector, Covid.19

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### **I. INTRODUCTION**

Risk is an inherent and objective element of a market economy, accompanying most economic transactions. Risk affects the performance of economic activities, jobs and income of workers. There are risks that can be predicted and foreseen to a certain extent (market risk), but there are also risks that occur suddenly and unexpectedly and are completely unforeseeable. The second type of risk often causes serious and unpredictable losses. The second type includes political risk, social risk and the risk of force majeure. Political risk refers to the possibility of a transaction being suspended or canceled due to political events, such as riots or war. It also includes risks arising from new restrictions imposed after a transaction is completed, the suspension of international payments by government authorities, and the requisition or confiscation of goods by the state. Social risk refers to the unpredictability of events such as strikes, riots, civil unrest, or the shortage of properly qualified personnel. Risk of force majeure consists of natural disasters such as storm, tsunami, earthquake, or volcano.

There have been many studies on the impact of risk on economic growth in literature. Bernanke 1983 built a theoretical model of irreversible choice under risk conditions to explain the cyclical fluctuations of investment. The author concluded that in the model when risk factors are present, events that are uncertain in the long run can create a temporary investment cycle where profits increase to wait for information. Katrakilidis and Tabakis 2004 used Greek data to find the relationship between macroeconomic risk and output by sector, in which macroeconomic risk includes inflation risk, exchange rate risk and output uncertainty. The results show that different sectors will have different responses to risk and the importance of macroeconomic stability in economic development. Neanidis and Savva 2013 studied the impact of real and nominal risks on inflation and economic growth. Using data from G7 countries for the period 1957-2009 and the EGARCH-M model, the study found that the relationship between risks and macroeconomic variables is a nonlinear and complex relationship. Bäurle and Steiner 2015 studied the impact of monetary policy, exchange rates and external demand on economic sectors. Using data from Switzerland, the authors found that these macroeconomic variables mainly affect the financial sector. Berger et al. 2017 studied the impact of macroeconomic uncertainties such as inflation, oil prices, commodity and stock prices, and international payments on economic growth. Using OECD data, they found an inverse relationship between national economic growth and macroeconomic uncertainties. Ozturk and Sheng 2018 decompose risk into two components: common uncertainty and idiosyncratic uncertainty and use data from 45 countries to assess the impact of these two types of risk on economic variables. The results show that common shocks will have a large and persistent negative impact, while idiosyncratic shocks have an insignificant impact. Kalay et al. 2018 study the combined impact of two shocks at two different levels on unemployment. They find that the impact of the combined shock will be larger than the impact of the firm-level and aggregate-level shocks. Jin et al. 2019 show that the impact of risk will be different with different levels of development. Macroeconomic uncertainty will have a positive impact on high-level innovation and an insignificant impact on low-level innovation (less developed cities). Ghirelli et al. 2021 used Spanish data to assess the relationship between economic activity and risk. They found a clear impact of policy risks and financial risks on private consumption, investment had a larger impact but recovered faster. Adediran et al. 2023 used the weather risk index to analyze the relationship between risk and the stock

market. The study showed that the weather risk index will be a good indicator for stock investment only after the macro environment is controlled.

However, there are not many studies using industry data related to risk. This study used Vietnam's industry data from 2017 to 2022 to analyze the impact of risk on the number of businesses, employment and average income. Risk affects everyone, all economic activities. However, the level of impact is different because the risk tolerance of different industries is different. The ability to forecast, prevent and manage risks of different industries will be different. The ability to overcome and recover from risks is also different. Managers and employees need to recognize and predict the possibility of risks, the level of impact as well as the ability to overcome risks of economic sectors in order to have a more stable choice of industries and fields of operation, reducing the impact when risks occur.

The world is always changing, risks are always present, after Covid.19 there are a series of risks related to geopolitics, tariff risks. With data from the industry from 2017 to 2022, the article focuses on assessing the impact of the risk of Covid.19 on businesses, jobs and income in different industries in the Vietnamese economy.

The Covid-19 pandemic is considered one of the most severe global economic disruptions in history. Most countries and territories were forced to shut down nearly all activities and close their borders. People were required to stay home, with only a few essential sectors permitted to operate. During this period, not only were economies heavily impacted, but human lives were also at serious risk.

How does this risk affect jobs and income of workers? This article analyzes the impact of unforeseen risks (Covid.19) on industries in Vietnam to see its impact on employment and income of workers, and the ability of businesses to operate. From there, the following conclusions are drawn: Covid.19 seriously affects economic activities in general, reducing economic growth, but the level of impact on different industries is relatively different. In the agricultural, forestry and fishery sector, the number of operating enterprises as well as the unemployment rate increased rapidly (about 16% of unemployment in 2020 compared to 2019), the number of enterprises operating in the agricultural sector also decreased by 1017 enterprises compared to 2019. However, the average income per worker increased by 10% compared to 2019. Income increased at a higher rate than industry and services. For the industrial and construction sector, in general, Covid.19 reduced the growth rate, but still recorded an increase in the number of enterprises (1%) and an increase in the average income per worker in the industry (5%), however, the number of unemployed workers increased by 2.64%. The impact of Covid.19 on specific industries in the industrial and construction sector is relatively different. The construction and mining sector has declined not only due to Covid.19 but also due to the economic structure (structural unemployment). The remaining industries were affected by Covid.19, reducing the number of enterprises or reducing jobs or reducing average income, but the medium-tech, high-tech and Electricity generation and distribution sectors still maintained growth rates in all three indicators, in which the high-tech sector (number of employees increased by 9%, average growth income increased by 7%), the medium-tech sector (1% and 9% respectively), the Electricity generation and distribution (9% and 1% respectively).

For the service sector, services were more severely affected than the industrial sector, both the number of workers and average income decreased due to Covid.19. In which, the biggest impact was the Accommodation and food services sector, the number of workers decreased by 17%, the average income decreased by 8%. However, there were service sectors that still increased both the number of workers and average income such as Health and social assistance, Finance, banking and insurance activities and Arts, entertainment and recreation. However, the increase was relatively low, about 2% of income. Due to the specific nature of the shock, the number of workers in the Health and social assistance sector increased by 16%, while the Finance, banking and insurance activities sector increased by only 5%.

Although more severely affected by Covid.19 than industry, the recovery of services was faster. In 2022, employment in the service sector increased by 9.39%, while the industrial sector increased by only 0.45% compared to 2021. The most impressive recovery in terms of the number of employees as well as average income is in the Accommodation and food services sector (up 27% and 31% respectively compared to 2021), but compared to the level before Covid.19, the employment in this sector still decreased by 12%. The most impressive recovery and growth compared to the level before Covid.19 is in the Health and social assistance sector, followed by the Information and Communications sector.

The rest of the paper is constructed as: Part II is the data and methods; Part III is results and the last is the conclusions.

## **II. DATA AND METHODS**

### **2.1. Data**

The data is used in this paper sourcing from the General Statistics Office of Vietnam (GSO): The White book of Vietnam which was firstly published in 2019. The books provide the data related to indicators of enterprises from 2017 to 2022.

Before 2019, data related to business was published, but it only included the general number of enterprises nationwide, not detailed for each locality, each field and different data. However, over the years, enterprises have contributed over 60% to the country's economic growth. To reflect the development process and recognize important contributions, and provide an overall picture of Vietnamese enterprises to domestic and international agencies, organizations and individuals, The Ministry of Planning and Investment (General Statistics Office) presided over the compilation and publication of the White Books on Vietnamese Enterprises. This publication is published annually.

The data in the white books is divided into two parts. The first part is the data of Vietnam's economy as a whole, and the second part is the data of each province in Vietnam. The measure indicators used in both parts of data are the same. To measure the performance of the Vietnam's economy, the white books divide the economy into some categories including business types or economic sectors. In cases of business types, the economy is divided into 3 types: State-owned enterprises, non-state enterprises, and FDI sector enterprises.

In cases of economic sectors, the economy is also divided into 3 types: Agriculture, forestry and fisheries; Industry and construction (where the industry sector is divided into four subsectors: Mining; Processing and manufacturing industry; Electricity production and distribution; Water supply, waste and wastewater treatment); and Services which are divided into 12 subsectors: (1) Wholesale and retail; repair of automobiles, motorcycles, motorbikes and other motor vehicles; (2) Transportation and warehousing; (3) Accommodation and catering services; (4) Information and communication; (5) Financial, banking and insurance activities; (6) Real estate business activities; (7) Professional, scientific and technological activities; (8) Administrative activities and support services; (9) Education and training; (10) Health care and social assistance activities; (11) Arts, entertainment and recreation; (12) Other service activities.

## **2.2. Method**

To measure the response of industries to risks, the article uses a comparative method. The comparison is made through the criteria of the number of operating enterprises, the number of affected workers and jobs, and the average income affected by industries before and after Covid.19 as well as the ability to recover after Covid.19 between industries.

## **III. RESULTS**

From 2017 to 2022, the number of enterprises which still operated at the end of the year increased from 560413 to 735455 enterprises, corresponding with 31.23%. However, the rate of growth of enterprises was not the same among years: the average rate during 2017-2019 was 9.21%; the average rate during 2020-2022 was only 3.2%.

Where the enterprises in the agriculture accounted for around 1% and it tended to decrease during 2017-2022, especially in 2022 it downed both absolute and relative in number of Agricultural enterprises. During 2017-2021, this number was around 1%, but it was only 0.78% in 2022. Contrary to the trend of decreasing both absolute and relative number of enterprises in the agricultural sector, the industrial sector witnessed growth both in absolute and relative number of enterprises. The number of industrial enterprises increased from 164187 to 231464, corresponding with from 29.3% to 31.47%, and the highest rate of industrial enterprises felt into 2022. And in the service sector, the absolute number of enterprises increased but the relative number decreased compared to the period before 2020. The number of service enterprises increased from 390762 to 498270 during 2017-2022, corresponding with from 69.73% to 67.75%.

Industrial sector is divided into two subsectors: Industry and construction. During 2017-2022, the number of enterprises in both subsectors increased, where industrial enterprises increased from 90486 to 127445; construction enterprises increased from 73701 to 104019. The share of construction enterprises was around 44.48% while the share of industrial ones was around 55.52%.

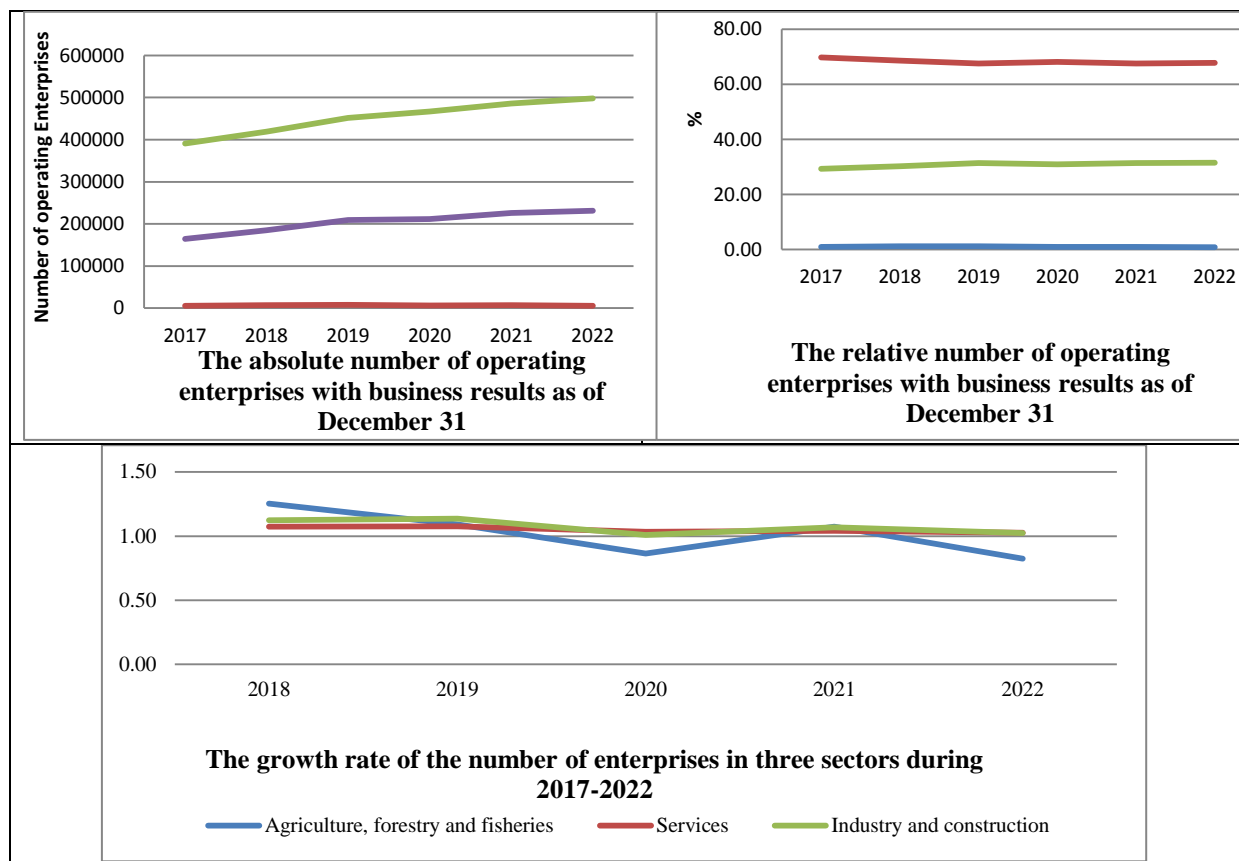


Figure 1. The number and growth rate of enterprises divided into three sectors during 2017-2022

The industrial sector is also divided into some subsectors where including low, middle, and high-tech industrial sectors; mining; electricity generation and distribution; and water supply, waste and wastewater treatment. The increase in the number of enterprises in those subsectors was quite the same (around 1.4 times during 2017-2022), except electricity generation and distribution sector (greater than other subsectors about 3.3 times).

Subsector accounting for the largest number of enterprises was the low-tech industry, but the share was lower and lower (from 52.4% in 2019 to 48.95% in 2021); the middle-tech accounted for 29%, the high-tech accounted for around 11% and the also tended to decrease during 2017-2022.

In services sector, the number of enterprises during 2017-2022 also increased from 39072 to 498270, corresponding with 1.28 times. It was lower than the growth of industrial enterprises.

Services sector also is divided into twelve subsectors which include (1) Wholesale and retail; repair of automobiles, motorcycles, motorbikes and other motor vehicles; (2) Transportation, warehousing; (3) Accommodation and food services; (4) Information and Communications; (5) Finance, Banking and Insurance; (6) Real estate business; (7) Professional, scientific and technological activities; (8) Administrative activities and support services; (9) Education and training; (10) Health and social assistance; (11) Arts, entertainment and recreation; and (12) Other service activities. The largest share in service was Wholesale and retail; repair of automobiles, motorcycles, motorbikes and other motor vehicles which accounted for around 55%; the second share was Professional, scientific and technological activities which accounted for around 12%; and the third share was Transportation, warehousing which accounted for around 8% during 2017-2022. During 2017-2019, Wholesale and retail; repair of automobiles, motorcycles, motorbikes and other motor vehicles and Transportation, warehousing were subsector which reduced the proportion in services; while the others' proportion mostly increased. However this trend was reversed. While the other subsectors reduced the proportion, the two above increased the share. Only the share of Health and social assistance increased during this period.

The number of enterprises increased, which helped create for many people. The number of employees increased from 14518326 to 15341632 employees, equivalent to 1.06 times during 2017-2022, where workers in agricultural sector decreased from 256734 to 215312 (approximately 0.84 times); in industrial sector increased from 9341740 to 9413831 workers (approximately 1.01 times); and in service sector increased from 4919852 to 5712489 workers (approximately 1.16 times). The industrial sector has still been a sector which provided the

most jobs in the economy, which accounted for over 60%, but the share reduced during this period from 64% to 61%. The service sector provided over 30%, increased from 34% to 37%. The labor tended to move from agricultural and industrial to service sector. The trend of labor migration in the industrial and construction sectors is relatively different. While the number of labors in industria sector l increased from 7482818 to 8062707, the number of labors in constructions sector decreased from 1858922 to 1351124 people. In industrial sector the percentage of labors in subsectors mostly unchanged during this period (except in the low and high-tech industries, the percentage of labors in the low-tech reduced from 65% to 63%, while the percentage of labors in the high-tech increased from 20% to 22%).

Both industrial and services sectors did not witness the decline in the number of businesses during Covid.19 period, even they still increased but labors lose their jobs in this period rapidly. In 2020, the total number of labors losing their jobs was 449443 people. In 2021, the number of people losing jobs was quite the same. The number of labors losing their jobs mostly felt into industrial and service sectors, where the number of people losing their jobs in service area was 0.62 times comparing with ones in the industrial area. In 2021, the recovering of the jobs occurred in both sectors, but the recovering was faster in service sector.

In the industrial and construction sectors, most subsectors were affected by Covid.19 and the most affected areas were the construction and low-tech once in the absolute number of people losing their jobs. However, the lost jobs in the construction area was affected not only by Covid.19 but also trend of shrinking industries (structural unemployment). Surprisingly, the middle and high-tech industrial sectors were not impacted by Covid.19, the number of people working in these areas still increased during this period, especially in high-tech sector. Most industrial sectors recoved in 2021 and attracted more labors than before 2020, except the low-tech industrial, mining, and construction sectors (the losing jobs in mining and construction areas happened also by structural unemployment).

Covid.19 also affected the service sector seriously, but the magnitute was different across subsectors. The negative impact (the decrease in job number) in wholesale and retail, repair of automobiles, motorcycles, motorbikes and other motor vehicles; Transportation, warehousing; Accommodation and food services; and Professional, scientific and technological activities; where

Accommodation and food services was impacted the most severely (reducing 17% comparing to before Covid.19). Surprisingly, the growth of employment contined in other service sectors during Covid.19, and the highest growth rate was in Health and social assistance, then in Education and training, and Administrative activities and support services. Employment recovery in services is faster than in industry. In 2022, the rate of losing jobs in industrial area still was lower 2% comparing to before Covid.19, but in service area was higher 8% comparing to before Covid.19, where Health and social assistance, Information and communication, Administrative activities and support services, Finance, banking and insurance activities, and Real estate business were the most impressive.

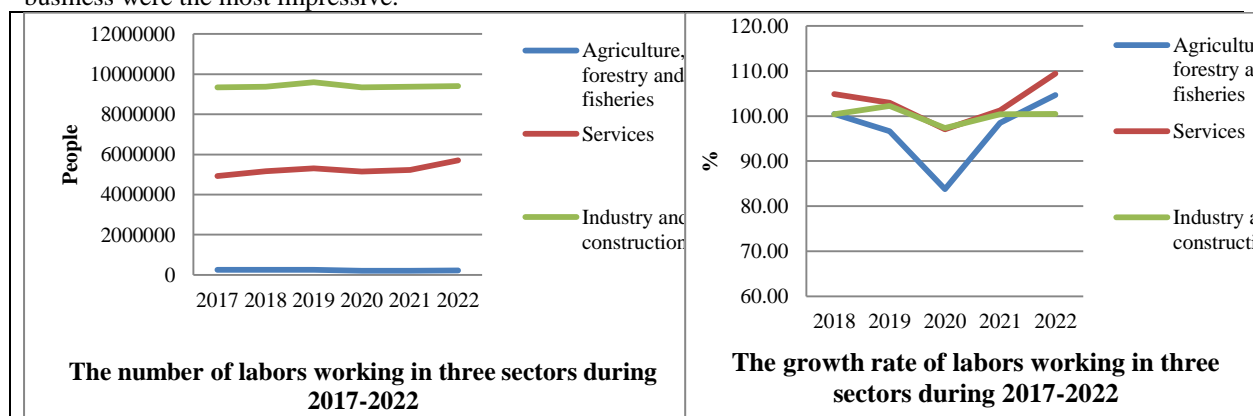


Figure 2. The number and growth rate of enterprises labors working in three sectors during 2017-2022

The more important thing with the labors is the income. How does risks affect the income of the labors among sectors? In general, the income per worker increased 1.39 times during 2017-2022 (equivalent to from 8269 to 11499 thousand VND per month). Interestingly, the growth of the income per worker was positive during 2017-2022. It improved that the Covid.19 did not still reduce the income per woker, in general. Although the growth rate of the income per worker was the lowest during Covid.19 (in 2020, this growth rate was 2%, comparing to 7% in average in this period).

The average income in the agricultural sector was the lowest and in the service sector was the highest during 2017-2022. The average income in agricultural was 5245 and 7668 thousand VND per month in 2017 and 2022, respectively. It equals 0.63 and 0.67 times comparing to the average income of the whole. Interestingly, the growth of the income per worker in this area was the highest during Covid.19 period (2020-

2021) comparing to itself and two other sectors. The growth rate in 2020 and 2021 was 10% and 16%, respectively. And during 2017-2022, the average income in agricultural area also was higher than two other areas (its growth was 8%, while two others' growths were 7%). However, the recovery rate of the agricultural sector reduced rapidly in 2022, it only got 7%.

The average income of the industrial sector also increased annually during 2017-2022, also including in Covid.19 period. It increased from 7758 to 10641 thousand VND per month, corresponding with 1.37 times. Although the average income still increased during Covid.19, the rate was the lowest (5%).

Covid.19 made the average income reduce only in service sector. In 2020, the average income reduced 1% comparing to in 2019, equivalent to from 10765 to 10611 thousand VND per month. However, its recovery rate was the highest after Covid.19, it got 14% in 2022, higher than 7% and 10% of agricultural and industrial sectors, respectively. The average income in service sector increased 1.39 times during 2017-2022, equivalent to 9406 to 13104 thousand VND per month.

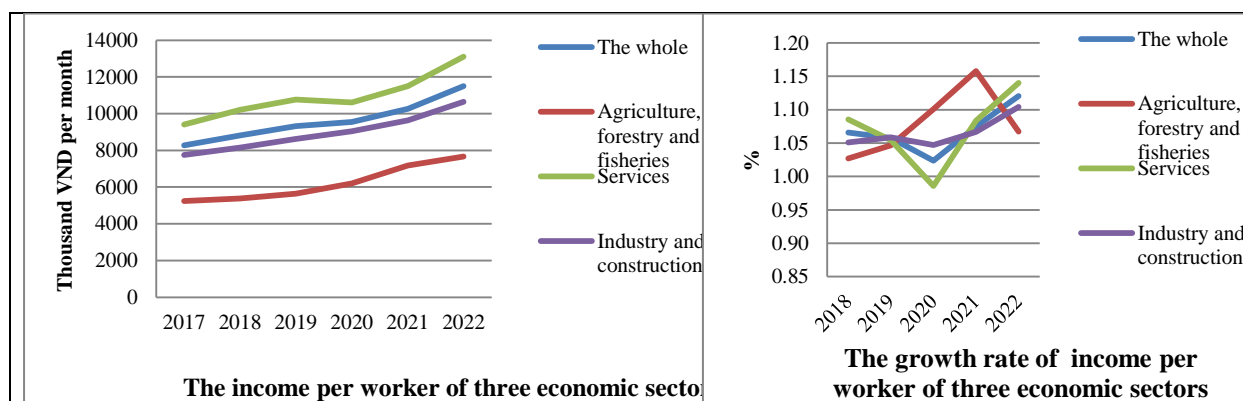


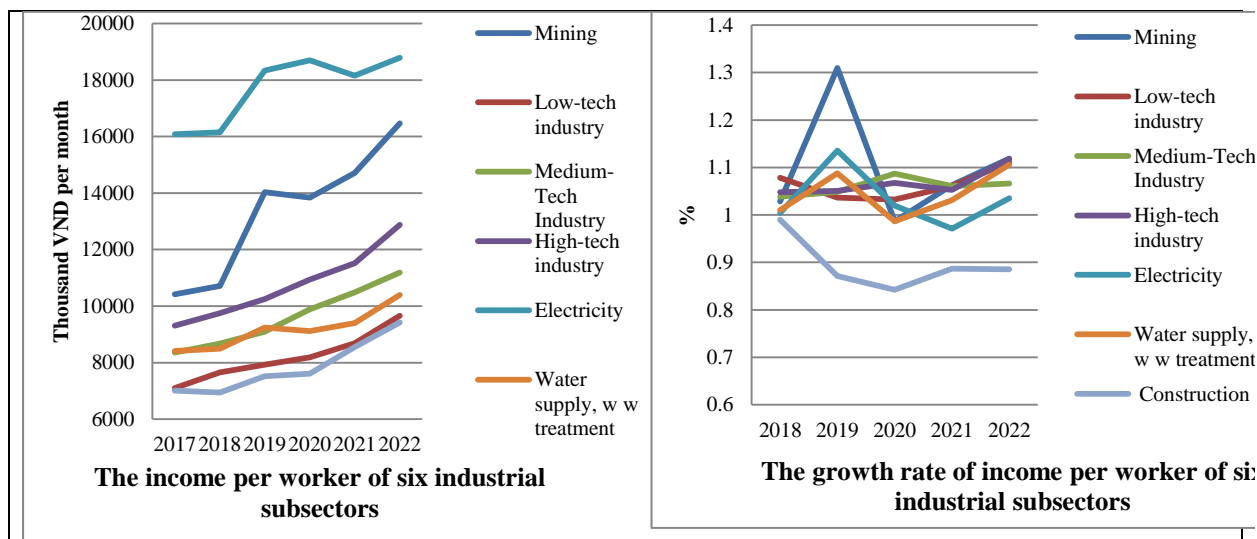
Figure 3. The income per worker and growth rate of the average income of three economic sectors during 2017-2022

Now, we investigate more details the change in the income per worker in subsectors of the industrial and service areas. Industrial sector includes two subsectors: industrial and construction sectors. During 2017-2022, the income per worker of the industrial subsector was greater than the one of construction one (around 17%), where the biggest difference was in 2021 (around 22%).

Industrial subsector then is divided into four categories: Mining, Processing and manufacturing industry, Electricity generation and distribution, and Water supply, waste and wastewater treatment. During Covid.19 period (2020 and 2021 in Vietnam), the income per worker in those categories still increased, except the one in Mining and Water supply, waste and wastewater treatment in 2020. The Processing and manufacturing industry is divided into three categories which are the low, middle, and high-tech industries. These three categories' average income rose also during 2017-2022, especially during Covid.19 the growth rate of the average income of middle and high-tech industries was higher than the one in previous period (around 88% and 70%, respectively).

During 2017-2022, the growth rate of the average income of the mining industry was the highest, the next to was the one of the high-tech industry, and the lowest rate of the one fell into Water supply, waste and wastewater treatment industry. However, during Covid.19 and recovery periods (2020-2022), the highest rate of the average income was the one of the high-tech industry (around 8%), higher 2%, 5% and 7% than of mining, water supply, waste and wastewater treatment, and electricity generation and distribution industries, respectively.

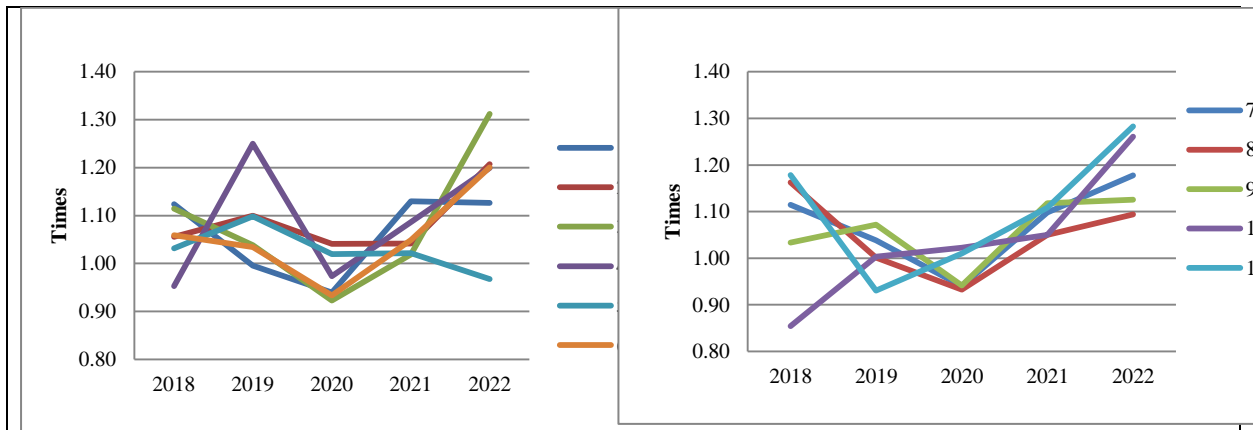
The highest income per worker belonged to the Electricity generation and distribution industry. Its average income was nearly twice as high as the industry average during 2017-2022 (1.98 times). Although this industry is a monopoly industry, the average income of the industry decreased significantly in 2021 compared to 2020 and recovered quite slowly compared to other industries. Perhaps due to the characteristics of the Covid.19 pandemic, when all social activities almost stopped or were only at a maintenance level, the demand for electricity of society during this period decreased significantly, affecting the average income of the industry.



**Figure 4. The income per worker and growth rate of the average income of six industrial subsectors during 2017-2022**

The service sector is also divided into 12 categories as mentioned above. The income per work of these subsector is quite different. There were five subsectors having the average income higher than the general average income of the service sector, while seven other subsectors' average income were lower than the general income. The biggest difference in average income is between the Finance, banking and insurance activities and the Accommodation and food services (around 3.08 times during 2017-2022, the year at which it had the highest gap was 2020, around 3.3 times).

Different from the average income of the agricultural and industrial sectors which was positive in 2020 (the most serious effect of Covid.19 on the economy and society), the one of the service sector was negative growth (the decrease in 1% comparing to in 2019). In twelve subsectors, there were seven subsector having negative growth rate of the average income in 2020, where there were three subsectors which had the higher average income than the general. The most serious effect of Covid.19 on the income per worker was the Accommodation and food services (reducing 8% in the average income), then the Real estate business Administrative activities and support services sectors (reducing 7% in both sectors). The subsector having the highest rate of the income per worker in 2020 was the Transportation and warehousing (4%), after that were the Finance, banking and insurance activities and the Health and social assistance (2%), and the last was the Arts, entertainment and recreation (1%). The recovery speed of the service sector was faster than industrial sector with respect to the income per worker. 8% in 2021 belonged to the service sector while 6% was of the industrial sector. In 2022, the recovery speed of the service sector was 14% while of the industrial was 10%. The subsector which had the highest rate of income was high-tech and mining industries (12%), while most subsectors' rates of income were greater than 12% (except the Finance, banking and insurance activities). Even some subsectors' income rates were greater than 20% (the Transportation, warehousing; Information and communication; Real estate business; Health and social assistance; Arts, entertainment and recreation). Besides the other service activities which had a very high rate of income in 2022 (59%), the Accommodation and food services have the highest recovery rate of income (31%).



Notes: From (1) to (11) represent eleven sub-service sectors as (1) Wholesale and retail; repair of automobiles, motorcycles, motorbikes and other motor vehicles; (2) Transportation and warehousing; (3) Accommodation and catering services; (4) Information and communication; (5) Financial, banking and insurance activities; (6) Real estate business activities; (7) Professional, scientific and technological activities; (8) Administrative activities and support services; (9) Education and training; (10) Health care and social assistance activities; (11) Arts, entertainment and recreation.

**Figure 5. The income per worker and growth rate of the average income of eleven service subsectors during 2017-2022**

In general, the risks always exist, some we can predict the magnitude of effect but many of them we still cannot predict. They happen suddenly such as Covid.19, earthquake, tsunami,...These risks cause serious damage. Living in a changing world, especially in economic area, knowing the economic area has a sustainable growth rate, withstand risks well and recover quickly from risks helps you make a better decision.

From above analysis, Vietnam's economy was hurt by Covid.19, but the growth rate was still positive. That is proved by some indicators. Firstly, the number of business increased across Covid.19 pandemic. The average rate of income also increased during Covid.19. Only the number of unemployees increased. However, the changes across sectors are quite different. All agricultural, industrial and construction, and service sectors all witnessed a decline in the number of workers during Covid.19, but the recovery of industries is quite different. While both agricultural and industrial sectors had a low rate of recovery, they have not yet recovered to pre-Covid.19 levels, the service sector has had an impressive recovery rate. In 2022, the number of labor in service sector was greater about 8% than in 2019.

Although the number of unemployees increased in industrial sector, the average income of subsectors mostly increased during 2017-2022. Especially, in medium and high-tech industrial sectors the number of labor and the average income still increased with the highest rate.

The service industry is the most vulnerable to the impact of covid.19. Not only did the workers reduced but also the income decreased, the number of labor reduced 3% and the average income reduced 1%. However, the recovery speed of the service sector was very fast. Compared to before Covid.19, the number of workers increased by 8%, average income increased by 14%. The Health and social assistance and the Finance, banking and insurance activities are two service industries that increased both the number of employees and average income during the covid.19 period, except for other service activities.

#### IV. CONCLUSIONS

Operating in an environment with many potential risks, and risks are inevitable, predicting and providing solutions to minimize risks and impacts is of particular importance, especially in conditions where risks are increasingly occurring.

Covid.19, the Russia-Ukraine war, the US-China trade war, and the tariff war imposed by the US are risks that have a great impact on the development of economic sectors, on solving employment and income of workers. Understanding the response of industries to shocks as well as their ability to recover from shocks will help workers and managers to come up with shock prevention measures or choose industries with less risk or better risk tolerance.



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