

Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Trade and Finance



Master's Thesis

**Critical analysis of unconditional basic
income and its effect on labour market
and tax revenues**

Yang Yi

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CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

DIPLOMA THESIS ASSIGNMENT

Bc. Yi Yang

Economics and Management

Thesis title

Critical analysis of unconditional basic income and its effect on labor market and tax revenues

Objectives of thesis

This study aims to identify the positive effects and negative consequences of implementing an unconditional basic income in selected economic scenarios.

Methodology

The theoretical part will introduce the theory of unconditional basic income and confront it with existing knowledge from previous studies and practical experiments with the so-called unconditional basic income.

The analytical part will define model scenarios with different levels of unconditional basic income and variable estimates of the induced voluntary unemployment rate in the selected economy.

The analysis of induced unemployment will consider factors such as age, industry, and job characteristics, depending on the availability and validity of the data.

As part of evaluating the model situations, the impact on public expenditures and revenues will be considered, along with potential changes in other parameters identified during the research process.

This work's outcome will quantify the possible impacts of implementing different forms of unconditional basic income in the selected economy.

The proposed extent of the thesis

60 – 80 pages

Keywords

unconditional basic income, social system, state budget, expenditures, costs, taxation

Recommended information sources

- DELSEN, Lei. Empirical Research on an Unconditional Basic Income in Europe. Berlin: Springer, 2019. ISBN 978-3-030-30043-2
- GENTILINI, Ugo, Margaret GROSH, Jamele RIGOLINI, Ruslan YEMTSOV, Franchesca BASTAGLI and Teresa TER-MINASSIAN. Exploring Universal Basic Income: A Guide to Navigating Concepts, Evidence, and Practices. Washington, DC: World Bank, 2020. ISBN 978-1464814587
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The Diploma Thesis Supervisor

Ing. Lukáš Moravec, Ph.D.

Supervising department

Department of Trade and Finance

Electronic approval: 18. 10. 2023

prof. Ing. Luboš Smutka, Ph.D.

Head of department

Electronic approval: 3. 11. 2023

doc. Ing. Tomáš Šubrt, Ph.D.

Dean

Prague on 12. 02. 2024

Declaration

I declare that I have worked on my master's thesis titled "Critical analysis of unconditional basic income and its effect on labour market and tax revenues" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the master's thesis, I declare that the thesis does not break any copyrights.

In Prague on 31/03/2024

Bc. Yang Yi

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Critical analysis of unconditional basic income and its effect on labour market and tax revenues

Abstract

The aim of the author's thesis is to investigate the positive and negative consequences of the implementation of Unconditional Basic Income (UBI) in selected economic scenarios, as well as to find out which factors affect the labour market and tax revenues in the region in the context of UBI. The economic scenario chosen for this thesis is Macau, China, and it is studied in relation to a similar unconditional basic income policy - wealth partaking scheme (WPS).

The author developed two linear regression models for the labour market and tax revenues, respectively, where the labour force participation rate and the tax revenues of the Macao government were used as the dependent variables of the two regression equations, respectively, and the Macao Statistical Bureau and the Wealth Partaking Scheme of the Government of the Macao Special Administrative Region provided data for the study, for the period from 2008 to 2022.

Based on the data analysis, the number of WPS beneficiaries (cheque cashing), the total amount of WPS (cheque cashing) and the number of students in tertiary education affect the labour force participation rate in a small and positive way; however, tax revenues are rarely affected by the number of WPS beneficiaries (cheque cashing) and private final consumption expenditures.

Keywords: unconditional basic income, social system, state budget, expenditures, costs, taxation

Kritická analýza nepodmíněného základního příjmu a jeho vlivu na trh práce a daňové příjmy

Abstrakt

Cílem autorovy práce je prozkoumat pozitivní a negativní důsledky zavedení nepodmíněného základního příjmu (UBI) ve vybraných ekonomických scénářích a také zjistit, které faktory ovlivňují trh práce a daňové příjmy v regionu v souvislosti s UBI. Ekonomickým scénářem zvoleným pro tuto práci je Macao v Číně a je zkoumán ve vztahu k podobné politice nepodmíněného základního příjmu – systému účasti na bohatství (WPS).

Autor vypracoval dva lineární regresní modely pro trh práce a daňové příjmy, přičemž jako závislé proměnné obou regresních rovnic byly použity míra participace pracovní síly a daňové příjmy vlády Macaa, přičemž údaje pro studii poskytl Statistický úřad Macaa a systém účasti na bohatství vlády zvláštní administrativní oblasti Macao, a to za období od roku 2008 do roku 2022.

Z analýzy dat vyplývá, že počet příjemců WPS (proplácení šeků), celková částka WPS (proplácení šeků) a počet studentů v terciárním vzdělávání ovlivňují míru participace pracovní síly malým a pozitivním způsobem; daňové příjmy jsou však zřídka ovlivněny počtem příjemců WPS (proplácení šeků) a výdaji na soukromou konečnou spotřebu.

Klíčová slova: nepodmíněný základní příjem, sociální systém, státní rozpočet, výdaje, náklady, zdanění

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1. Introduction

In recent years, there has been a growing national debate about unconditional basic income. In the aftermath of the 2008 financial crisis and with the development of new technologies such as artificial intelligence. There has been intense debate on whether an unconditional basic income could be a useful welfare policy to combat poverty and unemployment, and experiments have been or are being conducted in some countries or regions.

Macau, as a special administrative region of China, decided to implement a Wealth Partaking Scheme to alleviate the pressure of living of its residents after the world financial crisis in 2008, which was affected by inflation. In this thesis, to investigate the positive and negative impacts of the Wealth Partaking Scheme on the labour market and tax revenues in Macao, it is necessary to have a comprehensive understanding of the historical background, the development process, and the current situation of the Unconditional Basic Income (UBI). The results produced by the implementation of UBI in each region or country will vary depending on the local situation, so it is also necessary to study all aspects of the local industrial structure, tax system and economic environment in Macau. Hereafter, the factors affecting the labor market and tax revenues in the context of the implementation of the Wealth Partaking Scheme will be explored.

The conclusion of this essay will explore the benefits and drawbacks of the Wealth Partaking Scheme when it is implemented until 2022, considering Macau's special industrial structure and its special tax system.

2. Objectives and Methodology

2.1 Objectives

This study aims to identify the positive effects and negative consequences of implementing an unconditional basic income in selected economic scenarios.

2.2 Methodology

Because of the long history of Unconditional Basic Income (UBI) and the fact that it is currently being or has been implemented in several countries or regions around the world, this article will include a literature review on UBI. A Literature Review is an essential part of a thesis or article on a particular topic, as it allows the author to review existing research findings, gain a deeper understanding of the topic, and identify areas of the topic that have not yet been researched.

The literature review also plays a multifaceted role in this article. Firstly, it helps the author to understand the historical origins and development of Unconditional Basic Income (UBI), which helps to expand author's knowledge on the subject. Secondly, the literature review helps the author to understand the different perspectives on the Unconditional Basic Income policy, which helps to provide a theoretical basis for the study of the topic and helps to formulate hypotheses or research questions. Finally, the knowledge of UBI policies or similar policies implemented in different regions helped the author to understand the actual implementation of the policy in different national contexts and to compare whether there is a comparable approach in the region studied.

In the analysis part of the article, the author will use linear regression analysis to examine how the labour market as well as the tax revenues of Macau are affected in the context of a similar UBI policy. The type of data used for the analysis is from the Macao Special Administrative Region of China - Macao Statistics and Census Bureau and the official website of the Wealth Partaking Scheme, and the period chosen for the analysis is 2008-2022, with yearly observations.

3. Literature Review

3.1. Basic Concepts of UBI

3.1.1. The definition of unconditional basic income

There are three main types of non-labour income: property income, business income and transfer income, of which transfer income is the various kinds of transfers from the State, units and social groups to households and income transfers between households. Of course, it also includes the government's transfer of personal income such as pensions, unemployment benefits, and compensation (Liu LI and Guo Yan, 2010). With the coming of the information age, more and more jobs are being replaced by artificial intelligence, and consequently the government needs to face many unemployed people and poverty and other problems. The "universal basic income" programme has also attracted more and more attention and has become a topic of discussion for most people.

Unconditional Basic Income, also called Universal Basic Income or Basic Income. There are many definitions of Unconditional Basic Income, Van Parijs and Vanderborght (2017) define it as being a form of public assistance that is available to all citizens and paid to them in cash. It is universal in nature and has nothing to do with an individual's income situation, work situation, or family situation; it is a right that the individual is supposed to have. And it certainly doesn't require producing evidence of a job or intent to work. The two definitions do not include targets, (uniform or differentiated between adults and children) levels (poverty lines), freedom to spend (as opposed to payments in kind or vouchers), nor do they mention taxes to fund a public basic income. The Basic Income Earth Network (BIEN, 1988) originally defined UBI as "cash given to each individual unconditionally, regardless of family financial situation or work status".

Overall, the definition of unconditional basic income must contain the following keywords: covering all population, unconditional, regularised, individuality, cash.

However, not all countries or regions follow the definition exactly when implementing an unconditional basic income experiment. For example, in the Finnish UBI case, the citizens selected were unemployed, low income earners and did not meet the definition of "covering the entire population" in the definition of UBI (Allas et al., 2020). As Delsen mentions in Empirical Research on an Unconditional Basic Income in Europe, Delsen (2019) mentions several different definitions and alternatives for UBI:

- The first is Full-UBI, as defined above, but this type of UBI policy is the most difficult to implement and often requires a lot of money. Hoynes and Rothstein (2019) argue that a full UBI policy, if implemented, would be very expensive: twice as much as the cost of the current U.S. transfer payment system. Microsimulations in Finland, France, Italy, and the UK suggest that providing a universal basic income for all at a meaningful but fiscally realistic level would require higher taxes and reductions in existing benefits. A universal basic income could lead to more income poverty (Browne & Immervoll, 2017; Brown & Immervoll, 2017).
- The second type is Partial-UBI, where the amount in such a model is not above the poverty line and does not fully meet the full definition of Unconditional Basic Income (UBI). An example of a permanent fund programme from Alaska (Goldsmith, 2010) and an unconditional income transfer from Iran (Salehi-Isfahani and Mostafavi-Dehzoeei, 2018) are two examples that can give illustrations.
- The third is on a comprehensive universal basic income - the Negative Income Tax - which combines social security and taxation, whereby incomes below an agreed minimum level are compensated through taxation.
- The fourth model, which is a basic income but subject to certain conditions, is called Participation Income, and is also an alternative to partial UBI. FitzRoy and Jin (2018) argue that if local governments can offer lower-paying jobs while providing a certain basic income, then it can go a long way in some extent solve the employment problem, it is a policy that can be productive.

3.1.2. Origins of UBI

The origins of UBI go back a long way, as far as the 16th century, although the concept of an "unconditional basic income" did not exist at that time, and it was only in Thomas More's (1478-1535) book *Utopia* that reference was made to a social form that ensured a stable, guaranteed income for its citizens (BIEN, 2024).

Thomas Paine (1737-1809) mentioned in his memoirs about the concept of welfare, and he argued that payments should be made to everyone, whether that person was poor or rich. He was not, however, the one who really advocated a basic income for life, but Thomas

Spence, who was of the same era as him, can be considered as such. In his pamphlet entitled *The Meridian Sun of Liberty*, published in 1796, it can be learnt that he shared Thomas Paine's views, and that they both believed that everyone owned land equally, so that "the land of every parish and its appurtenances became the property of the company or parish" Thomas Spence believed that men and women, married and single, new-born babies and grey-haired old men should all receive equally the remaining roughly one-third of the rent of the land. He presented a detailed and complete proposal for a basic income for life, which could also be called a fund. Like Thomas Paine and Thomas Spence, Charles Fourier (1772-1837) he believed that equal rights to the earth and its resources justified some form of income security (Philippe Van Parijs and Yannick Vanderborght, 2017).

Based on these three great men, it wasn't until 1848 that the Unconditional Basic Income (UBI) was first articulated on a national level. Joseph Charlier (1816-1896) who proposed to give every citizen the right to an unconditional basic income, to be paid on a quarterly (and later a monthly basis) in an amount to be determined annually by the National Council of Representatives on the rental value of all real estate. Possibly inspired by Fourier and his school, he saw equal land ownership as the basis for an unconditional right to certain incomes (Cunliffe and Erreygers, 2001).

By the twentieth century, unconditional basic income had become a topic of genuine popular discussion. Proposals for an unconditional basic income in the guise of a "social dividend", a "national dividend" and a "state dividend" were put forward in the debates in Britain during the two world wars (Thane, 2022).

Secondly, after a few years of silence, such ideas were rediscovered and gained considerable popularity in the 1960s and 1970s in the United States in the debates about "demagogues" and "negative income tax" schemes. In his popular *Capitalism and Freedom* (1962), the American economist and Nobel laureate Milton Friedman (1912-2006) proposed a radical simplification of the American welfare state through the introduction of what he called a "negative income tax". Friedman's proposal for a linear negative income tax would fully integrate the income tax and transfer system. It is presented as a simple and radical alternative to existing social welfare schemes (Friedman, 2013).

At the end of the 1970s and the beginning of the 1980s, several countries in north-west Europe began to actively discuss basic income proposals, entering a new period of debate and exploration. In 1986, the philosopher and economist Philippe Van Parijs organised a conference in Louvain-la-Neuve, Belgium, and to find out how many people

were interested in an unconditional basic income, and in defending the right to a basic income, they created the Basic Income European Network (BIEN). 1988 saw the publication of the first issue of the *Journal of Basic Income Studies*, devoted to a detailed analysis of the basic income concept. In 1988, the first issue of the journal *Basic Income Studies* was published, dedicated to a detailed analysis of the concept of basic income. The organisation changed its name to Basic Income Earth Network in 2004, from a European network to a global organisation (BIEN, 2024).

3.1.3. Different perspectives on UBI

In the last century, the geographical scope of the debate on unconditional basic income has expanded as the debate has intensified. In the European region, the debate on unconditional basic income began in the aftermath of the World War to alleviate the economic downturn brought about by the war. At the beginning of the century, Van Parijs (BIEN, 2024), investigating the various forms that basic incomes have taken and their relationship to the concept of kinship, found that unconditional basic incomes can be used as a strategic tool to combat poverty and unemployment. Comparing Germany's current welfare system with a proposal for an unconditional basic income, an unconditional basic income increases labour market participation even in a neoclassical labour supply model with no intrinsic incentive to work (Gilroy et al., 2013). A social-democratic perspective on basic income argues that the progressive vision of a full and unconditional basic income as a right available to all adult citizens is morally compelling (Jackson, 2017).

In some studies focusing on working adults, more people find that participation rates increase with a basic income policy (Bastagli et al., 2016). If someone receives this fixed and long-term funding, they may be caught in an 'unemployment trap', and so many have questioned whether unconditional basic income reduces employment, but Jones and Marinescu (2022) analyse the case of the Alaska Permanent Fund to see that cash transfers do not significantly reduce employment. Of course, in some developing countries such as Niger, UBI reduces the need for wealthy families to work in the fields. This provides UBI beneficiaries with more time to plan land resources and increases crop yields (Creti, 2010). However, it has also been argued that as more people are in precarious employment, the UBI policy does not provide people with income earning and good jobs for a long period of time, and that if the UBI policy is to be maximised, it could be used to get local authorities to provide below-wage jobs (FitzRoy and Jin, 2018). D'Orlando referred to the fact that the

provision of a fixed basic income favours social mobility and therefore has the potential to reduce inequalities in well-being (2022). Mitchell and Watts (2005) argue that the problem of income insecurity should be tackled at its roots, that the focus should be on what causes unemployment, and that the only constraints to achieving full employment are ideological and political.

Unconditional Basic Income is not conditional on gender, work, income, or family, and. Since Unconditional Basic Income is not conditional on income, simple mechanisms can make Unconditional Basic Income less costly to administer. It is an effective way to redistribute the benefits of automation and globalisation. However, basic income can also lead to several problems arising, and it is more important for governments to consider where the money for basic income can come from, which is one of the questions that has troubled many scholars and researchers. In addition to the discussion on the topic of whether unconditional basic income can help employment, there have been many scholarly discussions about the link between taxation and basic income. Some scholars have argued that unconditional basic income is unrealistic and does not take reality into account (Habermacher and Kirchgässner, 2013). However, Pereira(2015) argues that basic income is affordable and that cost savings could be achieved by replacing the current income guarantee scheme. Raventós (2019) proposes progressive tax reforms to fund a basic income equivalent to the poverty line, arguing that this is both feasible and just. A theoretical analysis of possible sources of unconditional basic income, for example, includes labour taxes, property taxes, consumption taxes, environmental taxes, and so on (Špeciánová, 2018).

The recession triggered by the financial tsunami on 9 August 2007 swept across the globe, and for most of the countries integrated into the world market, the Great Recession exacerbated unemployment as well as poverty, with unemployment in the United States of America reaching a peak of 10 per cent in October 2009, and only recovering to its pre-recession level of 4.7 per cent in May 2016.¹ The United States of America is one of the world's largest economies, and the United States is one of the world's largest economies. According to the CIA World Factbook, unemployment rates rose in most EU countries, such as Spain, Greece, and Italy, between 2010 and 2011 (Agency, 2009).

Since then, the debate on unconditional basic income has become more intense and broader, covering more developed countries and some developing countries.

The earliest start of implementation regarding UBI policies was in the US state of Alaska. Ten years after Alaska's statehood, the government discovered a great treasure

hidden in the land: oil, and in 1980 the Alaska Legislature passed Senate Bill 161, creating the Alaska Permanent Fund Corporation (APFC) to manage investments in the Permanent Fund and submit a list of permissible investments to state law. The Legislature also approved the first Permanent Fund Dividend (PFD) plan, which is similar, but not identical, to the concept of Unconditional Basic Income. The definition of UBI was mentioned earlier, and in the Alaska Permanent Fund Dividend Plan, the same thing is provided to residents on a regular basis, where individual dividend payments vary depending on the length of residency. It has been argued that dividends in the form of cash payments directly to state residents in the form of fund interest income benefit current Alaskans through higher personal incomes, higher employment rates, and a mitigated recession. Future generations may also benefit from the dividend distribution scheme because of its role in reducing fiscal illusions and limiting current state spending (O'Brien and Olson, 1990).

And the first country to put a UBI policy into practice for real is Finland, due to the fear that in the future a large number of jobs will be replaced by robots and artificial intelligence, and the fear that a large number of people will lose their jobs due to automation, in order to study and investigate how a basic income affects employment and well-being, the Finnish government started to introduce an experiment on unconditional basic income in November 2016, which was conducted by the Finnish Social Security Administration. The definition of unconditional basic income was mentioned earlier, whereby a certain amount of money is distributed or paid to each citizen on a regular basis without any checks on his or her financial situation and employment. This definition was not fully met in the Finnish experiment. Participants were required to be unemployed, on low incomes and aged between 25 and 58. Participants were divided into two groups, a control group, and an experimental group, which received 560 euros per month and continued to be funded even if some of them found work during this period. The experiment lasted only two years, 2017 and 2018. In a report from 2020 called "The UBI experiment in Finland 2017-2018", we can learn that the employment of the experimental group increased slightly after the comparison, and in addition the happiness of the experimental group during the period of receiving the basic income was significantly higher in a number of areas (Allas et al.,2020).

After the outbreak of the world financial crisis in 2008, many countries started to explore policies on unconditional basic income in order to cope with social instability such as economic recession, high unemployment and poverty, though most of the policies stayed at the experimental stage or were called off while still at the experimental stage due to certain

force majeure factors, such as the cessation of the Finnish experiment on unconditional basic income.

Poland's government implemented a family programme, which can be called a quasi-guaranteed income scheme, back in 2016. The aim of the programme is to reduce poverty and improve the standard of living of families. This programme is aimed at people who do not meet one of the definitions of Unconditional Basic Income (UBI) - Individuality, which means that the UBI should be distributed to individuals rather than on a family basis, the programme is aimed at families with many children and the government pays 500 PLN per month for the second and subsequent children, regardless of the family's income, but of course, if a family has an average net monthly income of only 800 PLN. Of course, if a family has an average net monthly income of only PLN 800 or PLN 1,200 and is raising a child with a disability, then the first or only child will also be subsidised by the government. Firstly, studies have shown that the programme has helped to reduce the poverty rate and increase the income level of low-income families; secondly, the programme has had a positive impact on the economy in terms of increased production as it has contributed to the growth of consumption and demand (Miształ, 2019).

With growing concerns about technological unemployment in developed economies, in 2011, SEWA, with funding from UNICEF, conducted an 18-month pilot study of universal basic income in eight villages in Madhya Pradesh, India, which targeted a total of roughly 6,000 beneficiaries in about 1,700 households, and disbursed Rs. 200 and Rs. 100 to participants above and below 18 years of age, respectively. and Rs. 100 (the amount of the fund was raised to 300 and 150 respectively at a later stage), and the final study showed that the unconditional basic income led to interest in small-scale investments such as sewing machines, seeds, shops, etc., which not only improved the health of the individuals to a large extent, but also increased school enrolment, and that the basic income brought in more labour and work, which led to more shifts from casual labour to self-employment in agriculture and business, among other jobs (Kumar and Kanojia, 2018).

Spain has been exploring the political aspects of the Unconditional Basic Income for many years, again to prevent people from being affected by unemployment and a range of precarious factors brought about by labour automation and artificial intelligence, and with a view to reducing growing inequality and poverty. The plan is also not only an experiment in unconditional basic income, but also aims to combine new cash transfer schemes with active social and labour inclusion policies. The Spanish government implemented the B-

MINCOME pilot case in the city of Barcelona between 2016 and 2019. The experiment was planned by the Urban Innovative Actions (UIA) programme of the European Union, which lasts for three years, and for the purposes of the experiment, the programme also does not meet the definition of unconditional basic income, and there are still several conditions that restrict people from joining the programme. For example, firstly, participants were required to have lived in the municipality for at least two years and to reside in the Eix Besòs area; secondly, the annual household income in 2017 could not exceed the family's annual basic living expenses, etc. A sample of participants was created by means of stratified random sampling, resulting in the selection of 1,000 people with an average fixed monthly payment of 500 euros. The analysis of the results of this experiment showed that the B-MINCOME project had a positive effect on individuals and reduced problems regarding scarcity and food insecurity. The availability of a regular monthly basic income also improved housing security and financial situation. In addition to this, life satisfaction was increased and indebtedness was reduced (Riutort et al., 2023).

From February 2019 to January 2021, the United States implemented a two-year experiment on unconditional basic income in the city of Stockton, California, recruiting a total of 331 people to participate in the experiment and dividing them into two groups, the experimental group, and the control group. Participants in the experimental group received a guaranteed income of \$500 per month, while the control group did not. The purpose of the study was to determine whether providing participants with an unconditional basic income had an impact on their health and financial outcomes, and to explore whether an unconditional basic income could be a potential public health intervention. Data from the first year of the experiment (up to February 2020) showed that the employment rate of the experimental group was seven per cent higher than that of the control group; the experimental group's income fluctuated at a lower rate and was more stable than the control group; and mental health also improved relative to the control group (West and Castro, 2023).

Unconditional Basic Income (UBI) is not only popular in Europe, but the Asia-Pacific region has also seen a heated debate on UBI, and in the South Korean province of Gyeonggi, the exploration of Unconditional Basic Income (UBI) began with the Gyeonggi Youth Basic Income Programme. This is the third largest basic income policy in the world and aims to support young people struggling to find work. Starting in 2019, the programme distributes a basic income to 24-year-olds in Gyeonggi Province to help them develop their

skills and explore how they can contribute to society. Participants receive approximately US\$900 (1 million won) per year in local currency to spend within Gyeonggi-do. The project was undertaken because this age group has just graduated from university and is under pressure to enter the competitive job market, not only by providing financial support, but also by encouraging them to participate in online education and upgrade their skills (Seong Yoo, 2020).

In addition, Mainland China and Macao, China were also affected by the world financial crisis in 2008, in which Macao, China started to explore the feasibility of Unconditional Basic Income (UBI). In the next section, we will talk about the reasons why Macao, China started to explore UBI, and how the policy of Unconditional Basic Income (UBI) is being implemented in Macao, China, which will consider the current situation of the labour market in Macao, China in recent years, the tax system, and the situation of COVID-19 in Macao.

3.2. UBI in Macau, China

3.2.1. Wealth Partaking Scheme in Macau

In 2008, the Chief Executive of the Macao Special Administrative Region, Edmund Ho Hau Wah, proposed the Wealth Partaking Scheme (WPS). The first is to share with the residents the funds received because of economic development; the second is to cope with the socio-economic impact of the financial crisis and to alleviate the pressure of life brought about by inflation; and the third is to enhance the regional economic benefits brought about by the sustainable development of the gaming industry. The Wealth Partaking Scheme in Macao is a programme like the Unconditional Basic Income Policy.

The way in which beneficiaries are identified and distributed:

There are three ways for beneficiaries to receive their wealth: The first one is the cheque payment: in this method of payment, the beneficiary status is that of a general resident, such beneficiary being a MSAR resident who meets the conditions stipulated by the law for receiving the amount of the Participating Plan and, in order to distribute the cheques more efficiently, in the Wealth-Sharing Plan the Government classifies them into age groups according to the year of birth, although the age classification varies from one

year to another, with priority given to the elderly, according to a descending order. Below are the pre-determined groupings for the Wealth Sharing Scheme from 2021 to 2022:

1. those born in or before 1964.
2. persons born between 1965 and 1983.
3. persons born between 1984 and 2004
4. persons born between 2005 and 2012.
4. persons born between 2005 and 2012
5. persons born between 2012 and 2020.
5. persons born between 2012 and 2021.

Crossed cheques issued by the MSAR Government for participation in wealth may be cashed in the year in which the cheque is made and are valid for three years from 31 December of that year. It means that the Government's permitted encashment period lasts until 30 December three years later.

The second type is bank transfer: in this method of receipt the beneficiaries are citizens who are receiving other social assistance, such as teaching staff receiving direct subsidies or professional development subsidies, students in higher education receiving student financial assistance from the Education Fund, recipients of disability benefits, etc., for a detailed classification see table 1. Since the other subsidies of this type of beneficiaries are paid by bank transfers, their distribution Since the other benefits of such beneficiaries are paid by bank transfers, their dividends are deposited into the same bank account with the benefits by bank transfers, which is more convenient and quicker, and reduces the cumbersome distribution procedures.

The third type is the proper distribution by the staff of the Social Welfare Bureau: the beneficiaries of this method of receiving the wealth sharing amount are generally unable to receive the wealth sharing amount by bank transfer or cheque, such as minors whose guardianship has not yet been established, etc., and the details of the classification can be referred to in table 1. In this case, the wealth sharing amount will be distributed to these beneficiaries in an appropriate manner.

Table 1 Identify of Beneficiaries and Modes of Distribution

Identity of Beneficiaries	Modes of Receiving amount of wealth partaking
General residents	Cheque
Teaching staffs receiving direct subsidy or subsidy for professional development	Bank transfer
Students in tertiary education receiving student aid from the Education Fund	
Persons registered for receiving tax reimbursement or other payments from Financial Services Bureau through bank transfer	
Civil servants have not yet registered for receiving tax reimbursement or other payments from Financial Services Bureau through bank transfer	
Retired civil servants receiving retirement pension and other persons receiving survivor pension	
Persons receiving subsidy for senior citizens	
Persons receiving disability subsidy	
Persons receiving financial assistance from the Social Welfare Bureau	
Persons assisted by the Social Welfare Bureau including: (1) Minors whose guardianship has not been established; (2) Incompetent persons; (3) Persons being deprived of their liberty by rehabilitative measure; (4) Persons being deprived of their liberty by measures or subjected to criminal punishment; (5) Other persons requiring assistance from the Social Welfare Bureau	Amount of wealth partaking will be disbursed by the Social Welfare Bureau in an appropriate way

Source: Wealth Partaking Scheme, Macao Special Administrative Region Government, 2022

The number of wealth-sharing amounts allocated each year is not fixed. In addition, the amount of contribution differs between MSAR permanent and non-permanent identity card holders. These amounts are subject to the administrative regulations issued every year.

As shown in Table 2 below, the amount received by each MSAR permanent and non-permanent resident increases from MOP 5,000 and MOP 3,000 in 2008 to MOP 10,000 and MOP 6,000 in 2022. In 2011, the Macao Government decided to grant a one-off cash subsidy to eligible MSAR residents to alleviate the pressure of living caused by inflation.

Table 2 Amount to be Distributed.

Year	Amount to be Distributed (MOP)	
	Holders of Macau SAR Permanent Identity Card	Holders of Macau SAR Non-permanent Identity Card
2008	5,000	3,000
2009	6,000	3,600
2010	6,000	3,600
*2011	4,000	2,400
2012	7,000	4,200
2013	8,000	4,800
2014	9,000	5,400
2015	9,000	5,400
2016	9,000	5,400
2017	9,000	5,400
2018	9,000	5,400
2019	10,000	6,000
2020	10,000	6,000
2021	10,000	6,000
2022	10,000	6,000

Source: Wealth Partaking Scheme, Macao Special Administrative Region Government, 2022

The time when the wealth sharing amount is released:

The distribution period is not fixed for each year, for example, in 2021, the distribution period is from 12 April 2021 to 7 June 2021, while in 2023, the distribution period is from 4 July 2023 to 21 August 2023. Not only that, but the distribution time varies for different classifications of beneficiaries in each year. Below are the distribution dates for each type of beneficiary from 2021:

- Distribution date through automatic bank transfer:

- 12 April 2021 for beneficiaries who are recipients of Old Age Allowance (OAA), teachers receiving Direct Subsidy or Professional Development Allowance (PDA), tertiary students receiving student financial assistance from the Education and Youth Affairs Bureau (Student Welfare Fund), or retired civil servants receiving pensions, and other recipients of Survivor's Pension.
 - The transfer date is 13 April 2021 in the case of beneficiaries who are registered to receive tax refunds or other payments from the Treasury by bank transfer.
 - The transfer date is 14 April 2021 for beneficiaries who are recipients of a disability benefit.
 - The transfer date is 15 April 2021 for persons whose beneficiary status is that of a recipient of SWA funding.
 - Beneficiaries in the capacity of civil servants who have not yet registered to receive tax refunds or other payments by bank transfer to the Treasury, with a transfer date of April 2021 salary payday.
- Dates of distribution of crossed cheques: the beneficiaries here are general residents and are divided into five categories according to age.
- For residents born in 1971 or before, the cheque mailing period is 19 April 2021 - 23 April 2021.
 - 1972-1991, mailed cheques are due 26 April 2021 - 30 April 2021.
 - 1992-2005, mailed cheque period 4 May 2021 - 7 May 2021.
 - 2006-2013, mailed cheque period 10 May 2021 - 14 May 2021.
 - 2014-2020, the cheque mailing period is 17 May 2021 - 21 May 2021.
- Social Welfare Bureau does not give a clear time frame on its official website, but only mentions that if some of the residents are beneficiaries in need of SWB's assistance, SWB will release the wealth-sharing amount to the residents as soon as possible and in an appropriate manner.

Figure 1 The poster of Wealth Partaking Scheme in 2021



澳門特別行政區
Região Administrativa Especial de Macau
Macao Special Administrative Region

現金分享計劃
Plano de Participação Pecuniária
Wealth Partaking Scheme

發放方式
Formas de pagamento
Modes of distribution

現金分享計劃——發放款項時間表
Plano de Participação Pecuniária no Desenvolvimento Económico - Calendarização do Pagamento
Wealth Partaking Scheme - Schedule for Distribution

4月 Abril April	自動轉帳 Transferência bancária automática Automatic bank transfer	<ul style="list-style-type: none"> 敬老金受益人 Beneficiários do subsídio para idosos Beneficiaries of Subsidy for Senior Citizens 領取直接津貼或專業發展津貼的教學人員及教育及青年發展局（學生福利基金）大專助學金受惠學生 Pessoal docente que recebe o subsídio directo ou subsídio para o desenvolvimento profissional e alunos que recebem bolsas de estudo para o ensino superior concedidas pela DSEDI (Fundo de Acção Social Escolar) Teaching staff receiving Direct Subsidy or Subsidy for Professional Development and beneficiary students of the Study Grant for Tertiary Education allocated by the Education and Youth Development Bureau (Student Welfare Fund) 領取退休金之退休公務人員及撫卹金受益人 Funcionários aposentados que recebem pensão de aposentação e beneficiários da pensão de sobrevivência Retired civil servants receiving retirement pension and other persons receiving survivor pension
12日		<ul style="list-style-type: none"> 已登記以銀行轉帳方式收取財政局發放的退稅金或其他給付的人士 Indivíduos que tenham registado a recepção da devolução de impostos ou demais pagamentos à cargo da DSF por transferência bancária Persons registered for receiving tax reimbursements or other payments from Financial Services Bureau
14日	殘疾津貼受益人 Beneficiários do subsídio de invalidez Beneficiaries of Disability Subsidy	
15日	社會工作局經濟援助金受益人 Beneficiários do apoio económico do IAS Beneficiaries of the financial assistance allocated by the Social Welfare Bureau	
4月份	未登記以銀行轉帳方式收取財政局發放退稅金或其他給付的公共行政工作人員（連同四月份薪俸自動轉帳） Trabalhadores da Administração Pública que não tenham registado a recepção da devolução de impostos ou demais pagamentos a cargo da DSF por transferência bancária (transferência automática em conjunto com o vencimento do mês de Abril) Civil servants have not registered for receiving tax reimbursements or other payments from Financial Services Bureau through bank transfer (Automatic bank transfer with salary of April)	

在澳門收取支票信件日期
Data de recepção do cheque em Macau
Receipt dates for cheques to be received in Macau

開始接受重發支票申請日期
Data de início do pedido de reemissão do cheque
Starting date for cheque reissue request

週 Semana Week	1	2	3	4	5	
	4/19 ~ 23					5/11
		4/26 ~ 30				5/18
			5/04 ~ 07			5/25
				5/10 ~ 14		6/01
					5/17 ~ 21	6/07

註：倘若市民在以上列出應收取支票信件的日期起計十個工作天後仍未收到支票信件，可按開始接受重發支票申請日期親臨位於南灣大馬路762-804號中華廣場2樓的市政署綜合服務中心、黑沙環新街52號政府綜合服務大樓或氹仔哥里布街225號3樓離島政府綜合服務中心的現金分享計劃櫃位查詢及重發。
 Atenção: Os residentes que não tiverem recebido o cheque após 10 dias úteis a contar da data para a sua recepção prevista acima mencionada, podem dirigir-se, na data de início do pedido da reemissão do cheque conforme indicada, aos balcões do Plano de Participação Pecuniária do Centro de Serviços do Território para os Assuntos Municipais, sito na Avenida da Praia Grande, n.º 762-804, Edifício "China Plaza", 2.º Andar, ou Centro de Serviços da RAEM, sito na zona Norte, Rua Nova da Sena Preta, n.º 52, ou do Centro de Serviços da RAEM das Ilhas, sito na Rua de Coimbra, n.º 225, 3.º andar, Taipa, para fins de consultá-lo e de reemissão do respectivo cheque.
 Note: Resident fail to receive his/her cheque in ten working days after the receipt dates indicated above, please visit the Wealth Partaking Disbursement help desk at Integrated Service Centre of Municipal Affairs Bureau located at Avenida do Praia Grande, n.º 762-804, 2nd floor of "China Plaza", Macao Government Services Centre situated at Rua Nova da Sena Preta, n.º 52, or Macao Government Services Centre in Islands located at Rua de Coimbra n.º 225, 3rd floor, Taipa for enquiries or reissue of cheque according to the date of re-issuing.

Source: Wealth Partaking Scheme, Macao Special Administrative Region Government, 2020

The above information is from the website of Macau Special Administrative Region of China - Wealth Partaking Scheme(2022).

Based on the above, the Wealth Partaking Scheme is somewhat different from the traditional unconditional basic income:

Firstly, there is a difference in purpose: the UBI is seen as a deserved income that guarantees citizens a basic standard of living and serves to reduce poverty and inequality of distribution. In contrast, Macao's "Wealth Partaking Scheme" was conceived as a temporary policy to share economic dividends with its citizens, even though it had been in place for many years.

Secondly, the amount is insufficient. The Unconditional Basic Income (UBI) aims to provide sufficient funds to meet the basic needs of citizens. According to the minimum subsistence index for a one-person household provided by the Social Welfare Institute (Government of the Macao Special Administrative Region - Social Welfare Institute, 2021), it can be known that a person needs at least MOP 4,350 per month to maintain a basic However, the total amount to be distributed by WPS in 2022 will be MOP10,000 (permanent residents) and MOP6,000 (non-permanent residents), which means that the amount to be distributed to each month will be very small.

In the previous section, it was mentioned about the characteristics of the traditional unconditional basic income: 1. covering the whole population; 2. unconditional; 3. regularised; 4. individualised; and 5. in cash. In WPS, the government pays the corresponding amount to the local bank account designated by some beneficiaries through automatic bank transfer, some residents will receive a crossed cheque from the MSAR government after providing their address information (including foreign addresses), and residents with special circumstances will be helped by SWI staff to obtain the wealth-sharing amount. Therefore, the term "cash" does not fully correspond to the characteristics of the unconditional basic income.

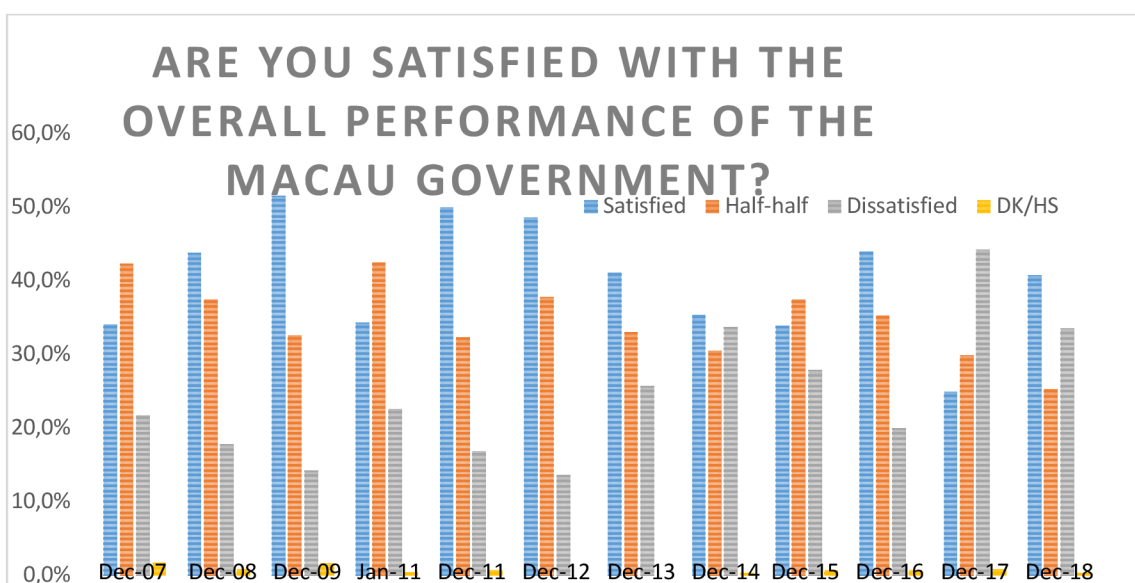
3.2.2. Benefits and drawbacks of Wealth Partaking Scheme.

Advantages:

In implementing the Wealth Partaking Scheme, the Macao Government has adopted the practice of paying cash directly into residents' bank accounts for some residents. This brings immediate benefits: for those residents who are not rich in personal income, this enables them to have sufficient liquidity in hand, which helps them to improve their living conditions and protects their basic income as well as their basic living costs.

"The Wealth Partaking Scheme was initially implemented as a result of the world financial crisis in 2008 to address the plight of the population in the face of inflation and a depressed consumer market. It has been implemented for 16 years from 2008 to 2023, and the amount of money has been increasing every year. According to the "Macau Annual Survey" conducted by the Hong Kong Public Opinion Research Institute (Hong Kong Public Opinion Research Institute, 2021), Macau people's satisfaction with the Macau SAR Government was 34.1% satisfied, 42.45% half-half and 21.8% dissatisfied at the end of 2007, and after several years of implementation, the satisfaction plus half-half ratios have remained at more than half. Therefore, the implementation of the "Wealth Partaking Scheme" will also have a certain impact on the political status of the government, increasing its popularity rating and improving its stability. However, from 2011 to 2014, the satisfaction rate declined year after year, including only 25 per cent in the 2017 survey, as shown in the figure below. The Macao Special Administrative Region Government has persisted in implementing this policy and the amount of money has been increasing, but the Government's reputation has not increased. The reason for this may be that people are getting used to the benefits offered by the Wealth Partaking Scheme. In 2011, the government gave out MOP4,000 and MOP2,400 to permanent and non-permanent residents respectively, while in 2010, the government gave out MOP6,000 and MOP3,600. The change in the amount of money has also caused dissatisfaction among the public, leading to a decrease in nominal satisfaction.

Figure 2 People’s Satisfaction in the Macau SAR Government



Source: own processing based on Hong Kong Public Opinion Research Institute, 2018

Drawbacks:

1. Increasing pressure on government expenditures from year to year.

"The Wealth Partaking Scheme" has both advantages and disadvantages for the Government, one of the advantages being that, according to the above description, the level of satisfaction of the population with the Government will increase in the years following the implementation of the Programme, while, on the other hand, it will lead to an increase in the Government's financial expenditures to a certain extent. According to the following data from the Financial Services Bureau of the Macao Special Administrative Region (MSAR), the Government's expenditures from 2014 to 2022, although decreasing in some of the intervening years compared to the previous year, have shown a general trend of growth.

Table 3 Total government expenditure of Macao

Year	Total government expenditure (millions of MOP)
2014	65 775,0
2015	80 479,6
2016	80 730,8
2017	77 692,7
2018	80 331,9
2019	82 101,1
2020	91 299,5
2021	86 212,1
2022	99 547,9

Source: own processing based on Government of the Macao Special Administrative Region, Financial Services Bureau, 2022

2. Social discontent after the reduction of the distribution amount.

Table 4 above shows that in 2011, the amount of money distributed by the Macao government was reduced compared to previous years, from 6,000 MOP (for permanent residents) and 3,600 MOP (for non-permanent residents) in 2010 to 4,000 MOP (for permanent residents) and 2,400 MOP (for non-permanent residents) respectively. The move caused widespread discontent in the community at the time. "The Wealth Partaking Scheme" has been argued by scholars (Chong and Jing,2016) to have contributed to a growing atmosphere of unearned income in society, as it was only a temporary policy in the

beginning, and although it has lasted for 16 years now, most residents inevitably see it as deserved "income".

3. Consumer confidence is consistently low

According to the Consumer Confidence Index (AUST, 2022) published by the Macau University of Science and Technology (MUST) in collaboration with the Capital University of Economics and Business (CUET), the Central University of Finance and Economics (CUFE), the City University of Hong Kong (City U) and the Catholic Fu Jen Catholic University (Fu Jen Catholic University). The Consumer Confidence Index of Macau has never exceeded 100 from the fourth quarter of 2009 to the fourth quarter of 2022, and a score below 100 means that the population has no consumer confidence, as can be seen in the following table:

Table 4 Macau Consumer Confidence Index Q4

Year	Macau Consumer Confidence Index Q4
2009	86.9
2010	81
2011	86.9
2012	88.4
2013	86.3
2014	87.4
2015	82.64
2016	83.63
2017	88.12
2018	91.4
2019	83.9
2020	86.5
2021	75.8
2022	77.56

Source: own processing based on Macao University of Science and Technology

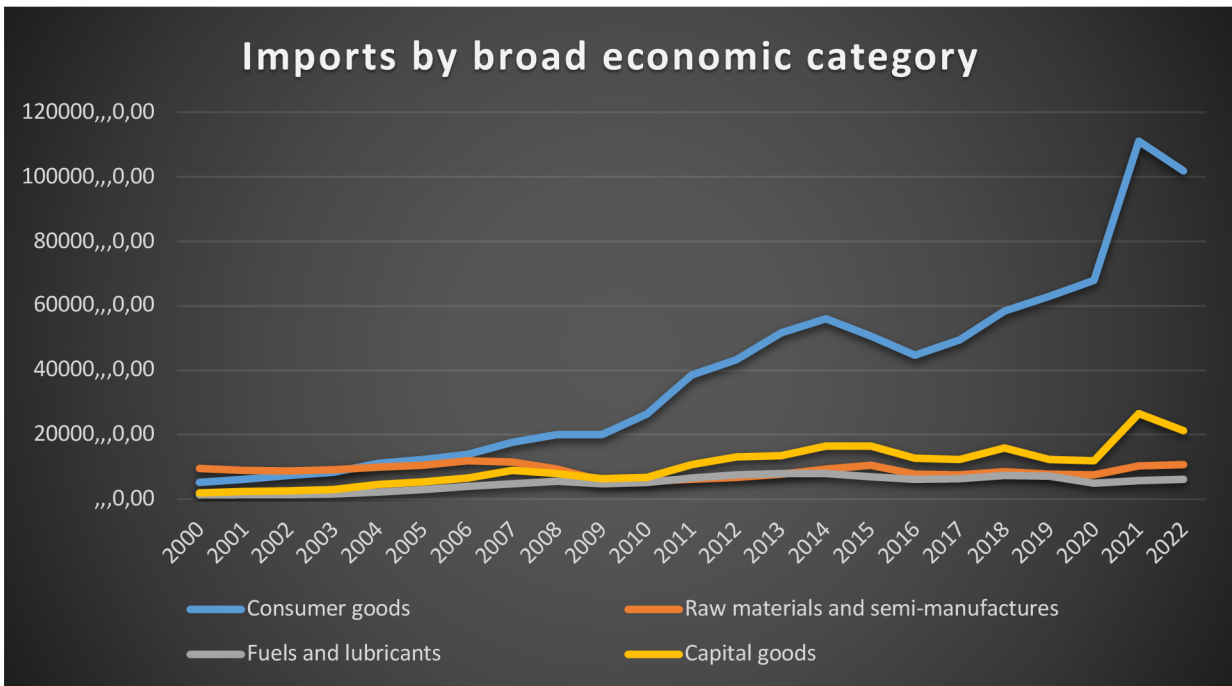
3.3. Labour market and tax system in Macao

3.3.1. labour market in Macao.

Industries are generally divided into three categories, namely, the first industry, agriculture, which includes agriculture, forestry, animal husbandry, fisheries, etc.; the secondary industry, industry, which includes extraction, manufacturing, water, electricity,

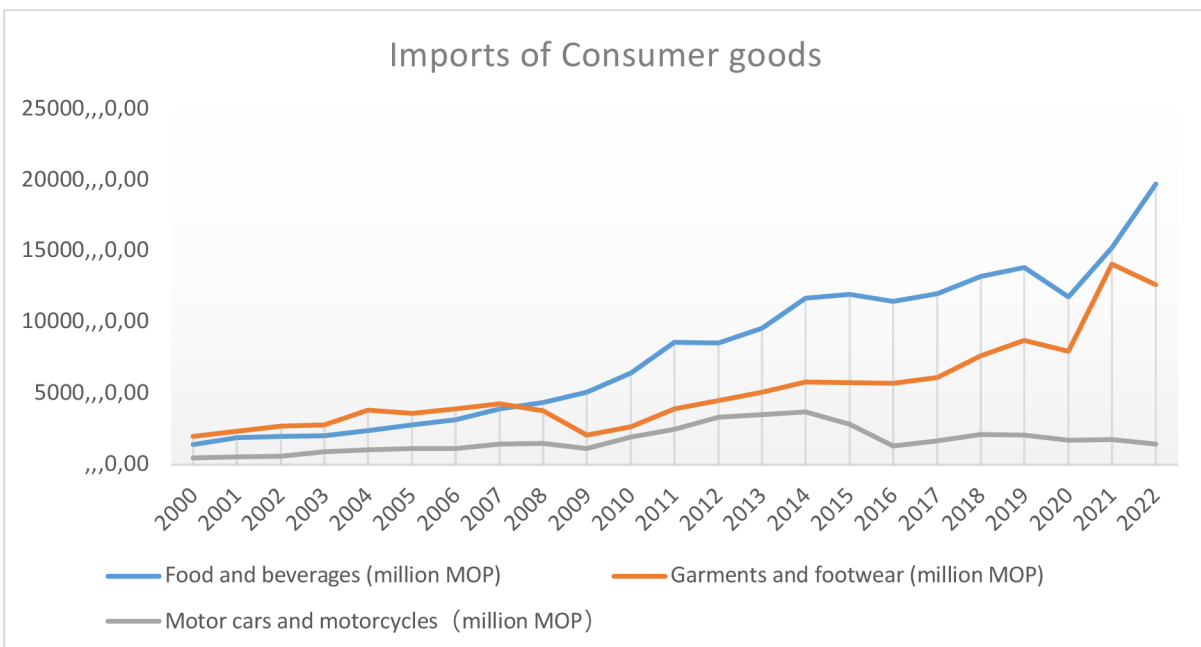
steam, hot water, gas, and construction; and the tertiary sector, services, such as wholesale and retail trade, food and beverage, financial services, gaming and so on. In the economic structure of Macao, land resources limit the development of large-scale agriculture or forestry, and the impact of these activities on the overall economy of Macao is too insignificant (Huang hanqiang, 1987). Moreover, due to the limitations of local agricultural production, Macao relies on imports for most of its food and agro industries. According to figure 2, from 2000 to 2022, imported food and beverages account for a higher share of imported consumer goods than the remaining three categories, and the categories of imported consumer goods in Macao are food and beverages, garments and footwear, motor cars and motorcycles and motorcycles. According to figure 3, the share of food and beverages gradually increases from 2000 to 2022. For food and agricultural products, Macao mainly relies on imports from other countries or regions, and at the end of the 1980s, agriculture disappeared from the primary sector of Macao's three-industry structure, while the quarrying and fishing industries remained and accounted for a negligible share of GDP, with the secondary and tertiary sectors accounting for most of the GDP (Guo yongzhong, 2009). In 1989, the Statistics and Census Department of Macao published data showing that the primary sector accounted for a negligible share of the GDP, the secondary sector 31.8 percent, and the tertiary sector 68.2 percent (Guo yongzhong, 2009), which means that by 1989, only the secondary and tertiary sectors were left in Macao's industrial structure. This means that by 1989, only the secondary and tertiary sectors were left in the industrial structure of Macao. Therefore, in the industrial structure of Macao, the Macao Statistical Institute did not classify the primary sector, but only the secondary sector and the tertiary sector.

Figure 3 Imports by broad economic category



Source: own processing based on Government of Macao Special Administrative Region, 2022

Figure 4 Imports of Consumer goods



Source: own processing based on Government of Macao Special Administrative Region, 2022

In 1999, Macao was officially returned to China, and on 31 March 2002, the Macao Special Administrative Region ended the 40-year-long gaming franchise of the Macau

Tourist and Entertainment Company Limited, thus opening the gambling rights of Macao. The opening up of the gaming rights not only promoted the rapid growth of Macau's GDP and the rapid development of Macau's economy, but also allowed more foreign capital and foreign tourists to pour into Macau. The rapid development of the gaming industry in Macao has not only brought in a constant flow of tourists, but also driven the development of related industries such as the hotel industry, the catering industry, the wholesale, and retail industry, and so on (Wang wuyi, 2012). The tertiary industry, with the gaming industry as its mainstay, is growing much faster than the secondary industry. Table 5 below shows the industrial structure of Macau from 2003 to 2022 according to the Statistics Bureau of Macau. Firstly, there is no data on the primary industry; secondly, the tertiary industry obviously occupies more than half of Macau's industries, with the proportion of the tertiary industry reaching a maximum of 96.28 per cent in 2013, and a minimum of 84.68 per cent at the time of the survey. This shows that the tertiary sector is a huge contributor to both the labour force and the economy of Macao.

However, some scholars have found that Macau's industrial structure is unbalanced and leads to economic fluctuations, and this will lead to Macau's inability to diversify well, which will bring about the crisis of industrial homogenisation (Liu and Lin, 2024).

Table 5 Industrial Structure of Macao

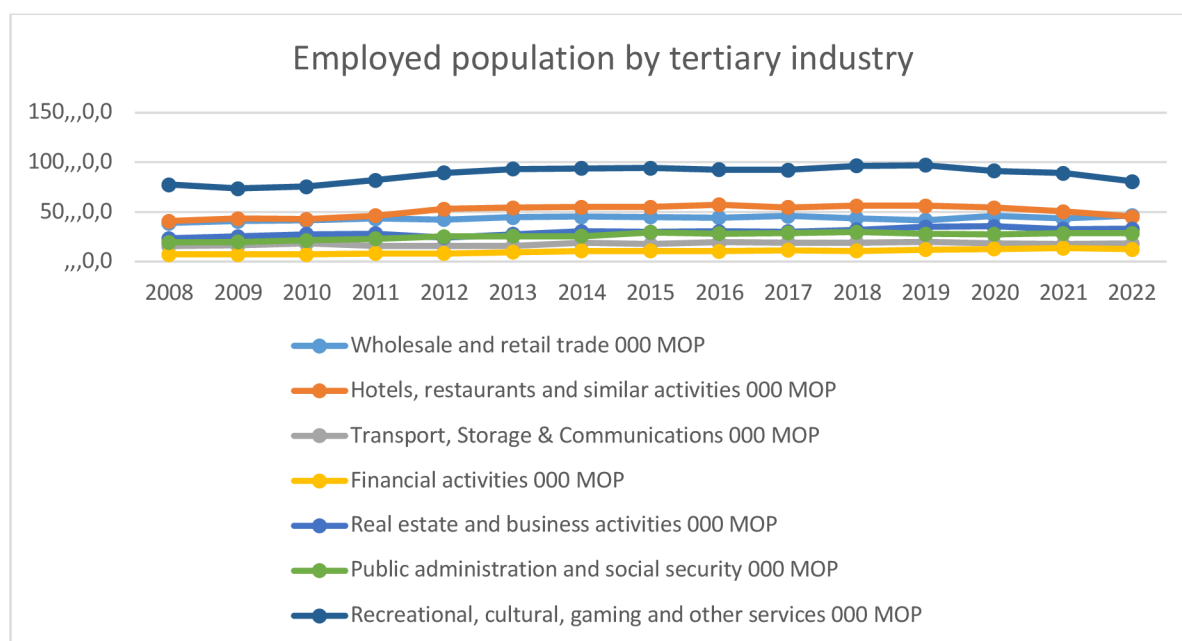
Industrial Structure of Macao		
INDUSTRIAL STRUCTURE AT CURRENT PRODUCERS' PRICES		
Year	Secondary sector %	Tertiary sector %
2003	10,09	89,91
2004	9,25	90,75
2005	11,74	88,26
2006	15,32	84,68
2007	14,32	85,68
2008	12,20	87,80
2009	7,58	92,42
2010	4,87	95,13
2011	4,15	95,85
2012	4,05	95,95
2013	3,72	96,28
2014	5,07	94,93
2015	7,74	92,26
2016	6,66	93,34
2017	5,07	94,93
2018	4,16	95,84
2019	4,31	95,69
2020	8,70	91,30
2021	7,77	92,23
2022	9,50	90,50

Source: own processing based on Government of Macao Special Administrative Region, Statistics and Census Service, 2022

From the above, it can be learnt that the tertiary industry in Macao occupies more than half of the economy, contributing greatly to the economic prosperity of Macao; not only that, the gaming industry, as mentioned in the previous article, is one of the driving vehicles for the rapid development of the tertiary industry in Macao. The following figure 4 is from

the Statistics Bureau of Macao on the number of people employed in each sector of the tertiary industry, from which it can be learnt that the number of people employed in the leisure, culture, gaming and other service industries is higher than the number of people employed in other industries, whether it is the number of people employed in the leisure, culture, gaming and other service industries that experienced the world economic and financial crisis of 2008 or the number of people employed in the leisure, culture, gaming and other service industries that encountered the world economic and financial crisis of the year COVIT-19. This proves that the gaming and entertainment industry plays an important role in Macau, and the line graph from 2008 to 2022 shows that the number of employed people has remained high, which shows that the development level of this industry is in a mature state, and that the gaming industry contributes a lot to the government's tax revenues.

Figure 5 Employed population by tertiary industry in Macao



Source: own processing based on Government of Macao Special Administrative Region, Statistics and Census Service, 2022

3.3.2. Tax System in Macao

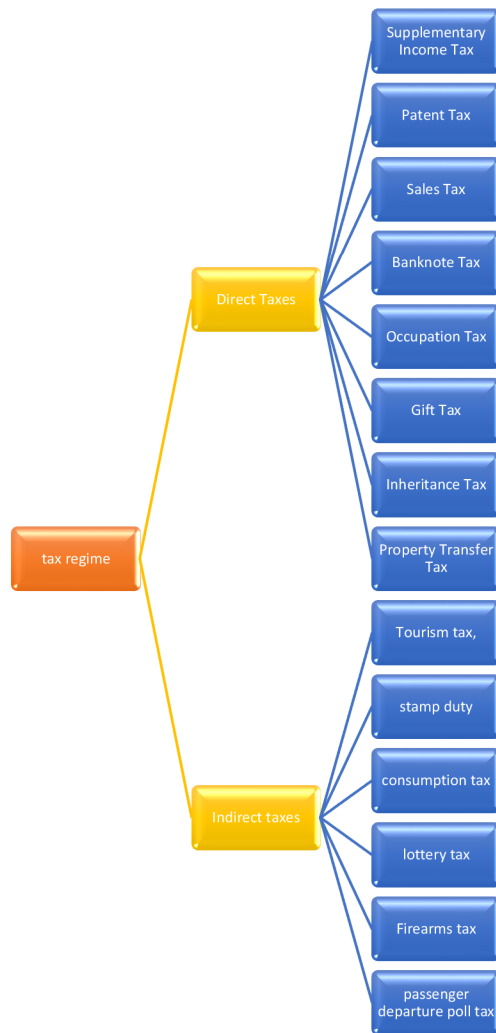
There is no doubt that the tax system has a profound impact on a country or a region, and the tax system is a very important part of the economy, and it is also a complex socio-economic product that plays a key role in the process of national and economic exchange (Privalov et al., 2022). For example, the rate of economic growth, the level of taxation,

income distribution, the quality of tax administration, tax rules and laws, and compliance with tax regulations (OECD, 2010).

In accordance with the provisions of the Basic Law of the Macao Special Administrative Region of the People's Republic of China, after the resumption of the exercise of sovereignty over Macao by the Chinese Government on 20 December 1999, the Macao Special Administrative Region shall maintain its financial independence, and the revenue of Macao shall be used exclusively for its own needs and shall not be surrendered to the Central People's Government, which shall not levy any taxes in the Macao Special Administrative Region, and which shall have the autonomy to legislate on the types of taxes, their rates, concessions and other tax matters. The Central People's Government does not levy taxes in the MSAR. Therefore, Macao has an independent tax system and is characterised by low taxes. As a free port, no customs duties are levied on imported goods (National People's Congress, 1993).

Currently, there are 14 taxes in Macao, which are levied and managed by the Macao government, and the tax year is from January to December. According to the essential distinction between taxes, there are two types of tax system implemented in Macao nowadays, the first one is the direct tax, which is the main source of tax revenue for the Macao government, and the second one is the indirect tax. Direct taxes include Supplementary Income Tax, Patent Tax, Sales Tax, Banknote Tax, Property Transfer Tax, Occupation Tax, Gift Tax, Inheritance Tax; and Indirect Taxes: Stamp Duty, Consumption Tax, Tourism Duty, Lottery Duty, Firearms Duty, and passenger departure poll tax (Wu Fusheng et al., 2021).

Figure 6 Types of Taxes in Macau



Source: Author's processing, 2023

There are 9 major taxes including Supplementary Income Tax, Sales Tax, Occupation Tax, Urban Housing Tax, Excise Tax, Motor Vehicle Tax, Stamp Duty, Tourism Tax, and Special Tax on Gaming (State Administration of Taxation, 2019). The largest contributor to Macau's tax revenue is the special tax on gaming. The consumption tax, tourism tax and special tax on gaming will be introduced in detail below:

- Consumption tax: The current consumption tax in Macao is levied only on imported tobacco and alcoholic beverages.

- Tourism Tax: Tourism Tax is a tax levied by the Government of the Macao SAR on the income derived from services provided by hotels and similar establishments, fitness rooms, saunas, massage parlours and karaoke establishments in the Macao SAR. Tourism tax is declared and paid by the service provider, but the actual

taxpayer is the consumer. Tourism tax is levied on services provided by hotels and similar establishments, fitness rooms, saunas, massage parlours and karaoke establishments at a rate of 5 per cent, with the basis of taxation being the price of the services provided. However, service charges (up to 10 percent) and income from communication and laundry services are excluded from the tax. In addition, taxpayers are required to file a tax return by the end of each month for the previous month.

- Gaming Tax: Gaming Tax, or Special Tax on Gaming, is a tax levied on the operation of lucky bets in casinos in the Macao SAR in accordance with the Legal Framework on the Operation of Lucky Betting in Casinos of the Macao SAR under Law 16/2001, which was amended by Law 7/2022 and re-published in July 2022, and it is a tax on the revenue from all types of gaming activities (including lucky bets, races, lotteries, etc.). All types of gaming activities (including lucky bets, horse races, lotteries, etc.) are subject to tax based on business income. The rate of the special tax on betting is 35 per cent. The taxable base of the betting duty is the gross gaming revenue, and the tax rate is 35 per cent. The MSAR Government may require gaming operators to provide bank guarantees to avoid the risk of tax loss. In addition to the betting duty, the gaming enterprises are required by law to pay other related taxes and fees. However, with the approval of the Chief Executive, the gaming enterprises may be exempted from the Supplementary Tax on Income, either partially or in full. Enterprises operating in the gaming industry are obliged to withhold and pay the relevant tax on behalf of the commission or remuneration paid to gaming intermediaries at a rate of 5 percent.

The above information about Macau's tax system and the types of taxes are from China Belt and Road Network (State Administration of Taxation, 2019).

From this, we can see that among the nine major taxes, the tax rate of the gaming industry is 35 percent per year, which is the highest compared to other taxes, including the aforementioned fact that the number of people employed in the gaming industry from 2008 to 2022 accounts for a large portion of the total number of people employed compared to the number of people employed in other industries. It can also be proved that the gaming industry has made great help and support to the government's revenue. According to table 6, comparing the government expenditure before 2008 and in 2008 plus is nearly 50 per cent

more, and has been increasing year after year, the plan has increased the government expenditure.

Table 6 Total government expenditure

Year	Total government expenditure (millions of MOP)
2004	17 703,0
2005	21 184,3
2006	27 349,8
2007	18 286,3
2008	30 443,4
2009	35 459,9
2010	38 393,9
2011	45 593,3
2012	56 737,5
2013	51 388,6
2014	67 078,3
2015	80 753,8
2016	82 629,1
2017	77 692,7
2018	83 030,3
2019	84 683,4
2020	96 127,0
2021	89 153,1
2022	99 586,6

Source: Government of the Macao Special Administrative Region, Financial Services Bureau, 2022

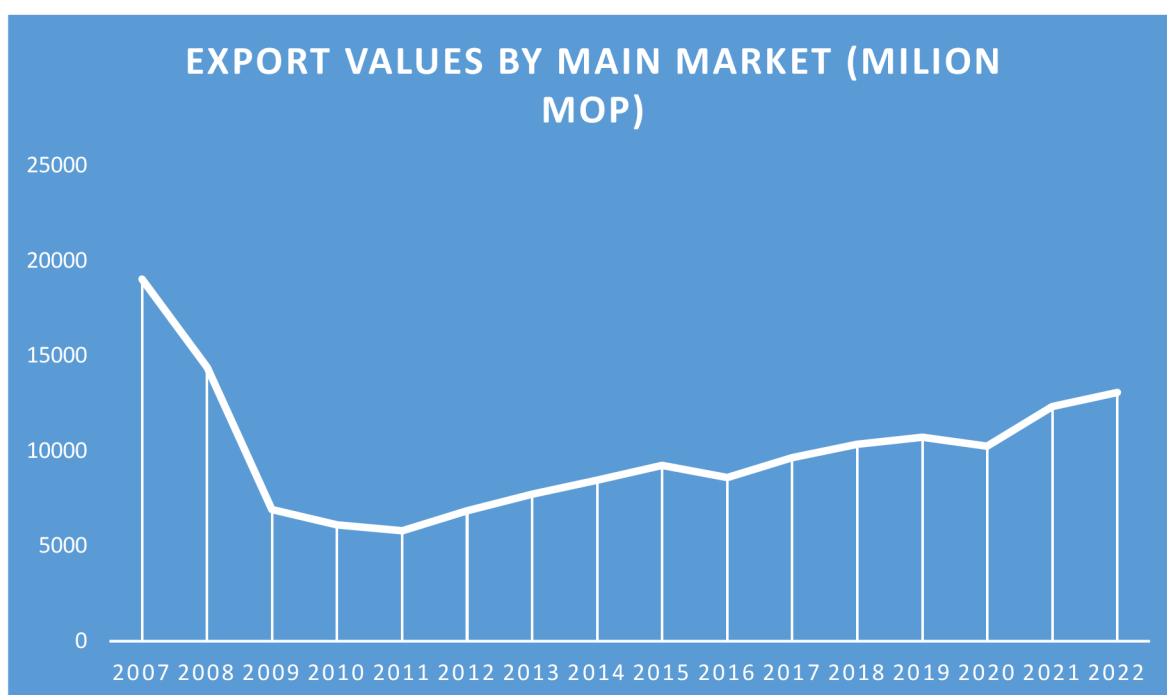
3.4. The impact of financial crisis in Macao, China and Covid-19 in Macao, China

3.4.1. The impact of financial crisis in Macao, China

If the WPS in Macao is to be mentioned, it would have to be in the context of the huge impact on Macao of the World Financial Crisis of 2008. Because this is one of the reasons why the Macau government decided to launch WPS. With the collapse of the financial system in September 2008, few countries associated with global financial markets and international trade were immune to the sudden downturn.

The financial crisis quickly spread around the world and led to a synchronized global economic slowdown in the second half of 2008, with many economies severely affected. Many export-dependent countries and regions in Asia, especially East Asian countries such as China, were severely affected. Although the People's Republic of China (PRC) has become the "world's factory", its foreign trade, especially exports, has been severely affected (Brunschwig et al., 2011). Mainland China has been affected by the world financial crisis and there is no doubt that Macao, as part of the Chinese territory, was naturally be affected as well.

Figure 7 Macao's total external exports



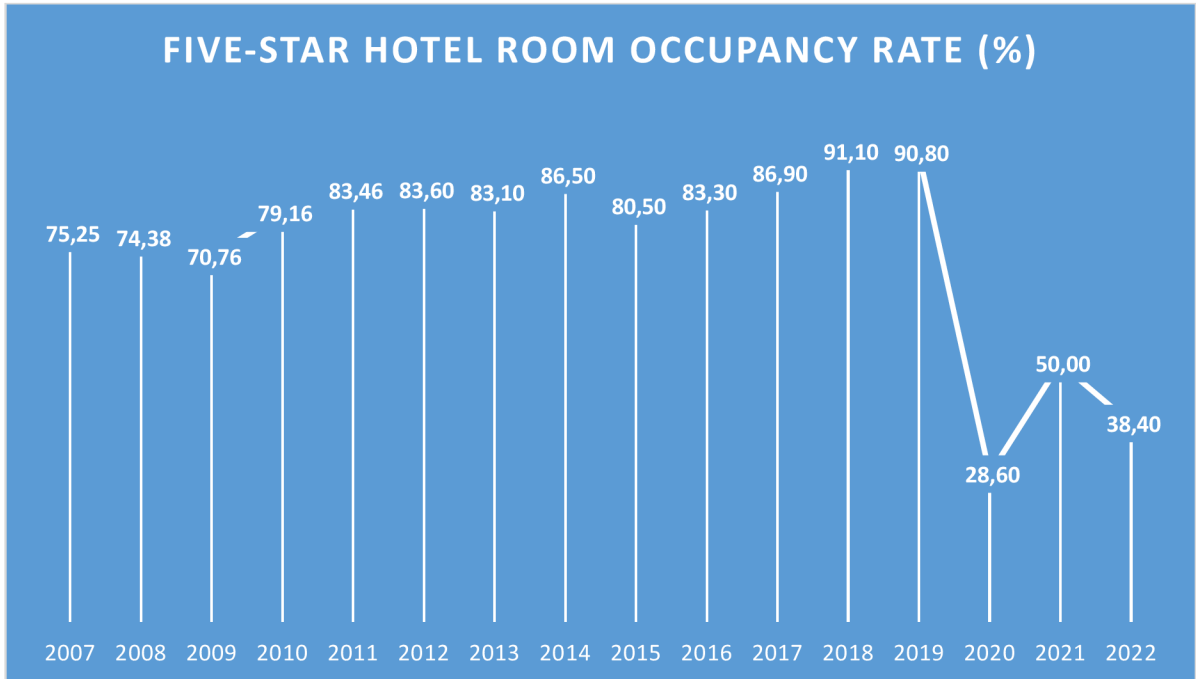
Source: Own processing basic on Government of Macao Special Administrative Region, Statistics and Census Service, 2022

According to the calculation of the Macao Statistics Institute (DSM), the total value of Macao's exports according to the main markets was 19,060.6 million patacas in 2007, while in 2008, 2009 and 2010, the total value of exports dropped to 14,395.91, 6,917.56 and 6,106.45 million patacas in the same order. In particular, the export volume in 2009 dropped by at least 50 per cent compared to that of 2008, as can be seen in figure 6.

Meanwhile some scholars have summarized the viewpoints of the negative impacts of the global economic crisis on tourism (Papatheodorou et al., 2010). Besides, for the Asia-Pacific region, especially the countries with entertainment, tourism and gaming as the main economic pillars have been more affected. For Macau, some scholars constructed a financial

engineering model to link Macau's gross entertainment revenue to key indicators of global financial markets over the years and found that Macau's entertainment (gaming) tourism industry is closely related to the performance of global financial markets (Chan, 2011).

Figure 8 Occupancy rate of five-star hotels



Source: own processing based on Government of Macao Special Administrative Region, Statistics and Census Service, 2022

When people talk about Macau, the first thing that comes to mind is that it is a tourist city. Because of its early colonial history, Macau is a city where you can see Buddhist, Taoist and Catholic architecture and traditional things at the same time. As we can see from figure 7, when the world financial crisis hit Macau, the occupancy rate of five-star hotels in the city dropped from 74.38 per cent in 2008 to 70.76 per cent in 2009, a slight decline.

Macau's gaming industry is the most important pillar of tourism, and the first entertainment facility that most people think of when they visit Macau is the casino. This is also a product of Macau's special social environment, and has become the pillar industry of Macau's economy, and has a considerable impact on the prosperity of Macau's economy, but Macau's gaming industry has also been seriously affected by the financial crisis of 2008, for example, the gaming industry's revenues, and the gaming industry's income, and the gaming industry's income. From the Statistics and Census Bureau of the Macao SAR Government, it can be seen that the revenue from gaming and related services in 2006 and 2007 was MOP 84,976,062,000 and MOP 5,803,792,000 respectively, with a year-on-year change of 46.4

per cent in 2007 compared to 2006, and when the world financial crisis spread to the Asian region, the revenue from gaming and related services was 11.7 per cent in 2008 and 11.5 per cent in 2009, while the revenue from the financial crisis in 2008 was 11.7 per cent. In 2008 and 2009, when the world financial crisis spread to the Asian region, the revenue from gaming and related services amounted to MOP 1,012,477,000 and MOP 1,140,3031,000, respectively, with a 30.6 per cent rate of change in 2008 compared to 2007, and a 9 per cent rate of change in 2009 compared to 2008 (Government of Macao Special Administrative Region Statistics and Census Service, 2009).

According to figure 7, the occupancy rate of five-star hotels had a downward trend during the financial crisis, and it can be deduced that the number of tourists coming to Macau is also on a downward trend. When travellers come to a region, they will want to experience various local characteristics, which will lead to the development of local industries, such as the gaming industry, and when an industry has enough ability to attract travellers, it will also promote the positive development of the local tourism industry. The Macao Government has adopted an economic policy of integrating the gaming and tourism industries to promote the diversified development of Macao's tourism industry (Fan Li, 1998). The gaming industry is booming and in turn, the tourism industry is thriving. Therefore, the gaming industry and the tourism industry are affected by the financial crisis and at the same time, they are also affecting each other.

3.4.2. Covid-19 in Macao, China

According to the now accepted timeline, the start of the New Crown outbreak in mainland China was on 1 December 2019, with the first case in Wuhan, Hubei Province, China, followed by an outbreak of hair-sized infections, which then spread rapidly throughout China. The impact of the New Crown outbreak on Macau was first felt in early 2020. As Macau is a micro-economy, the impact of the virus on the economic and social aspects of the city was enormous. Prior to the New Crown epidemic, gaming and tourism, the backbone of Macau's economy, provided a huge boost to Macau's rapid economic growth. In contrast, the New Crown epidemic led to intermittent border closures and a sharp decline in the movement of people. The crisis lasted almost three years in China until early 2023.

According to table 7, Macau's total gaming revenue in 2019 was MOP296,085 million, while in 2020 Macau's gaming enterprises were hit hard, with a total revenue of

MOP63,939 million, a drop of nearly 80 per cent. 2021 saw a rebound but was still low compared to pre-Covid-19 earnings, and in 2022 it was even lower at MOP46,195. In 2022, it will be as low as MOP 46,195 million. Comparing the impact of Covid-19 on the operations of the six gaming companies, some scholars have found that for the year 2020, the revenues of the six gaming companies will fall by an average of 79 per cent (Zeng Zhonglu,2021).

Table 7 Total Receipts of Gaming Sector

Year	Total Receipts of Gaming Sector (million MOP)
2007	111 174
2008	85 218
2009	121 536
2010	190 672
2011	270 252
2012	306 822
2013	363 066
2014	354 056
2015	233 229
2016	228 997
2017	268 009
2018	304 710
2019	296 085
2020	63 939
2021	90 886
2022	46 195

Source: Government of Macao Special Administrative Region, Statistics and Census Service, 2022

Under such circumstances, the economic indicators of Macao in various aspects will also drop. It was mentioned earlier that the gaming industry and the tourism industry in Macao are mutually reinforcing. Some scholars have studied the impact of global epidemics on the tourism economy, with Macao as a case study. The study said that the Macao economy, which relies on gambling, has seen a drop in gambling revenues at the same time as Macao's GDP and median wage have also declined (Lim and To, 2022).

4. Analytical Part

Linear regression, a method of statistical analysis used to determine the interdependent quantitative relationship between two or more variables, is a more complex analysis. This method determines what effect the independent variable will have on the dependent variable. In this chapter, this method will be used to investigate the impact of the implementation of the WPS on the labour market and tax revenues in the Macau region, and the experiment will be conducted by setting up two separate linear regression equations to better focus on the impact on the labour market and tax revenues.

4.1. Linear Regression Analysis for labour market

Here the author has assumed a linear regression model with five regression variables in the following form and will explain the logic and connection behind these independent variables in turn.

$$y_{1t} = \beta_1 + \alpha_1 x_{1t} + a_2 x_{2t} + a_3 x_{3t} + a_4 x_{4t} + \varepsilon_1 \quad (1)$$

- Y_{1t} is the dependent variable of the first equation and represents the labor force participation rate in Macao in percentage points. It measures the proportion of the working age population that is willing to or is participating in the labor market, and of course includes both full-time and part-time people. It can help the author to explore whether WPS leads to more people choosing employment, in the same direction as the author want to explore.
- X_{1t} is the first independent variable and represents the number of beneficiaries using cheque cashing. There are two ways of payment in the scheme, the first is cash (through bank transfer) and the second is cheque cashing (through post). The reason for choosing the second one is because most of the categories paid through cash are students, retired persons, disabled persons, etc., financed by the education fund, while cheque cashing is for the general population who can work or are already working. The author concludes that there is a positive correlation between X_{1t} and the labor force participation rate. When the number of beneficiaries increases, the labor force participation rate also increases, so α_1 is assumed to be positive.

- X_{2t} is the second independent variable, which represents the total amount of cheque cashing in millions of Macao patacas. The author concluded that there is a positive correlation between X_{2t} and the dependent variable. Firstly, when the amount of money issued by the government gradually increases, it can increase the purchasing power of the people, thus increasing the demand for goods and services, which in turn can promote enterprises to expand production and create more job opportunities; secondly, the gradual increase in the amount of money issued can encourage more people to try to start their own business or choose a better position, so that they can have a basic living fund even if they fail. So, it is assumed that α_2 is positive.
- X_{3t} is the third independent variable which represents the number of students in higher education. The author believes that there is a positive correlation between this independent variable and the dependent variable. The implementation of WPS gives basic security to those who want to continue their higher education, which will temporarily lead to a decrease in the number of jobs, but in the long term, the more people who receive higher education, it will also lead to the development of the region's economic innovation, which in turn, creates jobs and allows more people to participate in the employment. So, it is assumed that α_3 is positive.
- X_{4t} is the last independent variable, which represents GDP in millions of Macao patacas. The author concluded that there is a positive correlation between GDP and the dependent variable. the implementation of WPS increased people's personal income, which prompted people to consume, demand increased, and firms increased their production when demand increased, so α_4 is assumed to be positive.
- and the inclusion of random variables indicates changes that are not predicted by the variables in the econometric estimation either. t stands for annual observations. The model of course has an intercept term β_1 , which will equal the labour force participation rate when all other variables are zero.

In addition to the assumptions about the sign of the variables, to make the model more persuasive, the author will expect that the model can comply with the following points:

There is no multicollinearity in the model. The presence of multicollinearity represents the presence of exact correlation or high correlation between the independent variables, which can make the model difficult to estimate accurately and is of no practical

use to the author for later interpretation. In this model multicollinearity is defined as the presence of a high degree of correlation between a set of independent variables and the threshold for rejecting or accepting the hypothesis is 0.75.

Heteroskedasticity will not be present in the model, the presence of heteroskedasticity indicates that the variance of the random error term is no longer constant, making the model not statistically sound. This step will be tested in Gretl using White's test.

The residuals follow a normal distribution or show a bell curve distribution. This step will be tested by the Jarque-Bera test.

Residuals in the model do not show autocorrelation in each period. The presence of autocorrelation can lead to inconsistency in the parameters. This item will be tested by Breusch-Godfrey test.

The parameters of the final linearity and the observed mean are equal to the fitted mean, otherwise the OLS cannot be used, and the model will be invalid.

The following data will be used as an estimation:

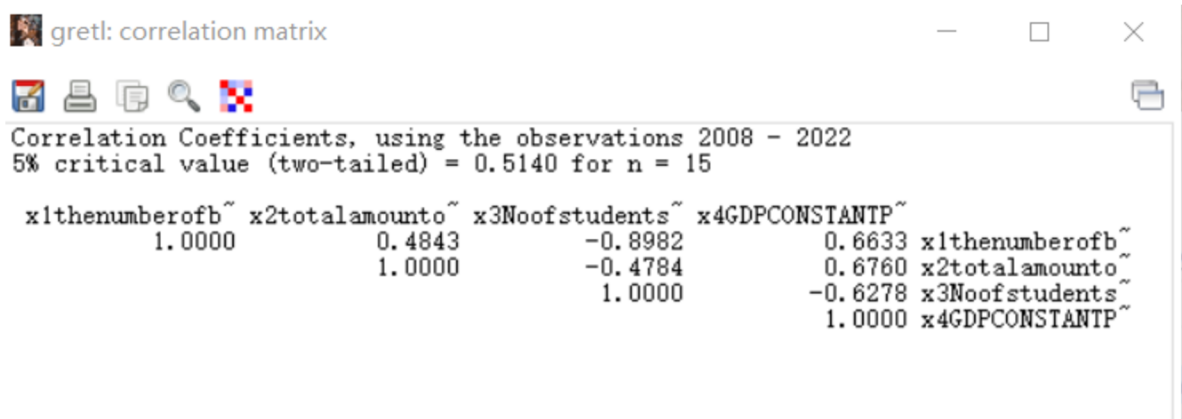
Figure 9 linear regression dataset for labor market

Year	Labor force participation rates	No. of Beneficiaries (using Cheque Cashing)	Total amount of Cheque Cashing(milion mop)	No. of students in higher education	GDP-CONSTANT PRICE(milion mop)
	Y1t	X1t	X2t	X3t	X4t
2008	70,00%	458 114	2 164	27 374	31 427
2009	72,30%	464 414	2 631	31 249	31 827
2010	72,00%	484 091	2 738	32 312	39 823
2011	72,50%	503 483	1 891	32 543	48 432
2012	72,40%	516 365	3 411	26 217	52 908
2013	72,70%	527 610	4 014	27 776	58 597
2014	73,80%	533 173	4 585	29 521	57 397
2015	73,70%	479 380	4 130	30 771	45 048
2016	72,30%	465 649	4 011	31 970	44 742
2017	70,80%	412 899	3 574	32 750	49 154
2018	70,90%	368 097	3 201	33 098	52 302
2019	70,30%	332 472	3 221	34 279	50 962
2020	70,50%	296 740	2 879	36 107	23 271
2021	69,00%	236 112	2 303	39 093	28 748
2022	68,60%	206 179	2 018	44 052	22 581

Source: own processing based on Macao Statistics Bureau and Macao Special Administrative Region Government, 2022

Here is the test for multicollinearity:

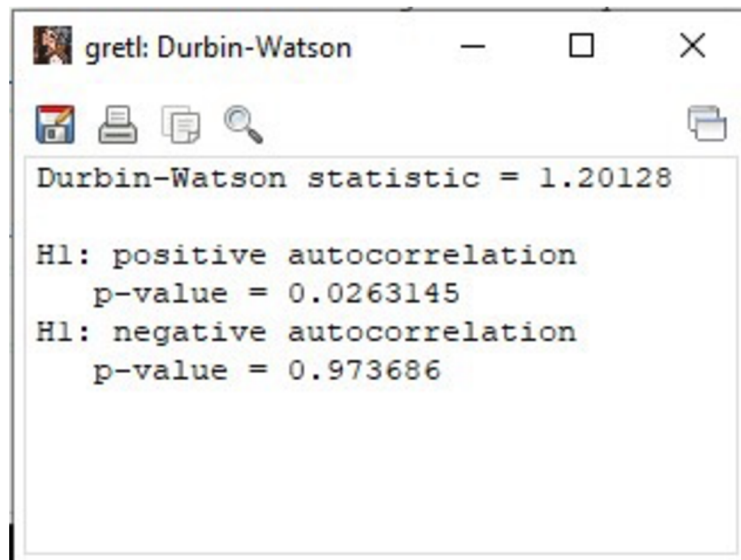
Figure 10 correlation matrix for first equation



Source: own processing based on Macao Statistics Bureau and Macao Special Administrative Region Government, 2022

From this, it can be known that there is no multicollinearity between the independent variables except for the correlation between independent variable X1t and independent variable X3t, the value of the correlation matrix is less than 0.75. However, the author would like to test whether the linear correlation between these two groups will bring a great impact on the model. Therefore, the correlation between these two variables will be tested by Gretl using Durbin Watson-test, as shown in the figure:

Figure 11 Durbin Watson test for variable (1) and (3)



Source: own processing based on Macao Statistics Bureau and Macao Special Administrative Region Government, 2022

A DW-test statistic close to 0 or 4 indicates a positive or negative correlation between the residuals. If it is close to 2, it means that the residuals are independent. As can be seen from the above graph, 1.2 is closer to 2 than it is to 0. So even though there is some linear correlation, it doesn't have much of an effect on the model and the two independent variables can be retained.

Figure 12 estimated parameter for first equation

	coefficient	std. error	t-ratio	p-value	
const	0.564992	0.0392595	14.39	5.20e-08	***
x1thenumberofben~	1.80805e-07	3.50115e-08	5.164	0.0004	***
x2totalamountofC~	7.16566e-012	2.55413e-012	2.806	0.0186	**
x3Noofstudentsin~	1.74422e-06	7.82911e-07	2.228	0.0500	*
x4GDPCONSTANTPRI~	-1.27821e-013	2.06432e-013	-0.6192	0.5496	

Source: own processing based on Macao Statistics Bureau and Macao Special Administrative Region Government, 2022

The coefficients are:

$$y_{1t} = 0.56 + 0.00000018x_{1t} + 0.0000072x_{2t} + 0.0000017x_{3t} - 0.00000013x_{4t} + \varepsilon_1 \quad (2)$$

The effect of the independent variable on the dependent variable can be known from the coefficient of the independent variable:

- When the number of beneficiaries (cheque cashing) increases by 1 unit compared to the previous year, the labor force participation rate in Macao is expected to increase by 0.00000018 units, a very small coefficient but one that is generally consistent with the expectation of the relationship between the two.
- When the total amount of cheques cashed rises by 1 unit, the labor force participation rate in Macao is projected to increase by 0.0000072 units, which is basically in line with the previous expectation for both.
- When the number of higher education students rises by 1 unit, the labor force participation rate in Macao is expected to increase by 0.0000017 units, which is basically in line with the previous expectation for both.
- The p-value of GDP is much greater than 0.05, proving that this variable is not significant at the 5% level of significance. This may have something to do with the

industrial structure of Macau, as the tourism and gaming industry is the largest contributor to Macau's GDP.

In conclusion, the author is satisfied with the results of the economic validation and even though the sign of the fourth independent variable is not as expected, the model is still economically logical and can be used to make general conclusions about the direction of change of the dependent variable.

The next step is about the mathematical verifications, firstly the mean value of the fitted dependent variable is compared with the observed value of the dependent variable, according to the analysis it can be known that both are equal to 0.714533, from the mathematical point of view it can be shown that the model is correctly built. A series of statistical parameters will also be listed below for statistical verifications:

Figure 13 statistical characteristics of the model for first equation

Mean dependent var	0.714533	S.D. dependent var	0.015829
Sum squared resid	0.000345	S.E. of regression	0.005870
R-squared	0.901776	Adjusted R-squared	0.862487
F(4, 10)	22.95209	P-value (F)	0.000050
Log-likelihood	58.82599	Akaike criterion	-107.6520
Schwarz criterion	-104.1117	Hannan-Quinn	-107.6897
rho	-0.233814	Durbin-Watson	2.229808

Source: own processing based on Macao Statistics Bureau and Macao Special Administrative Region Government, 2022

From the coefficient of determination in the above figure, it can be known that 90.1% of the variation in the labour force participation rate can be explained by the variation in the selected independent variables, this result can be said to be perfect, which indicates that these variables are explaining the dependent variable to a high degree. Adjusted R-squared reduces the effect of the model complexity on the goodness of fit, as it can be seen in the above figure, the value of Adjusted R-squared has a value of 0.86, which is like the value of R-squared, indicating that the model is well fitted.

This is immediately followed by the validation of the F-value and P-value:

The F-value is about 22.95, which is a relatively high value, indicating that the combination of independent variables explains a significant amount of the variance relative to the random variation.

Below is the F test, this helps the author determine if the model is statistically significant:

- $H_0: \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0$

- $A=0.05$
- F-test
- $P=0.00005$
- $0.00005 < 0.05 =$ at 5% significance level

The results indicate that the model can reject the null hypothesis where at least one of the independent variables has a statistically significant effect on the dependent variable.

The following statistical verification was carried out for the independent variables and t-tests were performed in Table.

Table 8 t-tests for first equation

$H_0: \alpha_1 = 0$	$H_0: \alpha_2 = 0$	$H_0: \alpha_3 = 0$	$H_0: \alpha_4 = 0$
$A=0.05$	$A=0.05$	$A=0.05$	$A=0.05$
$P=0.0004 < 0.05$	$P=0.0186 < 0.05$	$P=0.05 = 0.05$	$P=0.5496 > 0.05$
RESULT: The null hypothesis can be rejected, $X1t$ is significant at 5% significance level.	RESULT: The null hypothesis can be rejected, $X2t$ is significant at 5% significance level.	RESULT: The result is at the edge of acceptability and the null hypothesis can be rejected. $X3t$ is significant at 5% significance level.	RESULT: The null hypothesis cannot be rejected, $X4t$ is not significant at 5% significance level.

Source: own processing based on Macao Statistics Bureau and Macao Special Administrative Region Government, 2022

Overall, only one independent variable - GDP - is not significant at all at the 5% significance level, while all other independent variables are significant.

Finally, regarding the econometric verifications, the results will be based on Gretl's three separate tests:

Figure 14 econometric tests for first equation

```
White's test for heteroskedasticity -  
Null hypothesis: heteroskedasticity not present  
Test statistic: LM = 8.66362  
with p-value = P(Chi-square(8) > 8.66362) = 0.371462  
  
Test for normality of residual -  
Null hypothesis: error is normally distributed  
Test statistic: Chi-square(2) = 1.11794  
with p-value = 0.571799  
  
LM test for autocorrelation up to order 1 -  
Null hypothesis: no autocorrelation  
Test statistic: LMF = 0.522302  
with p-value = P(F(1, 9) > 0.522302) = 0.488215
```

Source: own processing based on Macao Statistics Bureau and Macao Special Administrative Region Government, 2022

Test for heteroscedasticity:

- H0: heteroskedasticity is not present.
- $\alpha=0.05$
- $P=0.37>0.05$
- RESULT: H0 is not rejected. NO heteroskedasticity.

Test for normality:

- H0: error is normally distributed.
- $\alpha=0.05$
- $P=1.118>0.05$
- RESULT: H0 is not rejected. Normality of residual is present.

Test for autocorrelation:

- H0: autocorrelation is not present.
- $\alpha=0.05$
- $P=0.488>0.05$
- RESULT: H0 is not rejected. No autocorrelation.

Overall, the model follows all the assumptions of linear estimation, so the model can be called BLUE model.

4.2. Linear Regression Analysis for tax revenues

In this section a linear regression equation on tax revenue will be developed with 1 dependent variable and 4 independent variables and the logic and connection behind the independent variables will be explained in turn. The form is as follows:

$$y_{2t} = \beta_2 + \alpha_5 x_{5t} + a_6 x_{6t} + a_7 x_{7t} + a_8 x_{8t} + \varepsilon_2 \quad (3)$$

- Y_{2t} is the dependent variable of the second equation, which represents the tax revenue of the Macao government in millions of Macao patacas. Macau's tax revenue includes both direct and indirect taxes.
- X_{5t} represents the number of beneficiaries using cheque cashing, which is the same as X_{1t} . The author concluded that there is a positive correlation between this independent variable and tax revenues. The more people participate in the WPS, the more people will have more personal income, thus boosting consumption.
- X_{6t} represents the total government expenditure of Macao in millions of Macao patacas. When the government spends more on public services, infrastructures, or social welfare (e.g. WPS), these may increase people's aggregate demand, thus boosting production and employment, then corporate profits and personal incomes will be higher, which will finally lead to an increase in tax revenues. So, this assumes that the relationship between X_{6t} and the dependent variable is positively correlated.
- X_{7t} represents the private consumption expenditure of Macao residents in millions of Macao patacas. The more people spend on private consumption, the more people may consume goods or services that enhance their standard of living, such as entertainment and leisure, thus boosting production and demand, and the amount of tax paid by enterprises will also increase. And of course, people will have to pay more consumption tax. So here the author assumes that there is a positive correlation between X_{7t} and the dependent variable.
- X_{8t} represents the gross revenue of Macau's gaming industry in millions of patacas. Gross revenue is the income from total revenue minus costs, which can measure the revenue capacity of a business. When gross revenue increases, tax revenue increases accordingly. It is assumed that there is a positive correlation between X_{8t} and the dependent variable.
- and the inclusion of random variables indicates changes that are not predicted by the variables in the econometric estimation either. t stands for annual observations. The

model of course has an intercept term β_2 , which will equal the labour force participation rate when all other variables are zero.

In addition to the assumptions about the sign of the variables, in order to make the model more convincing, the author will expect that the second model, like the first one, can fulfil several requirements, such as: there is no multicollinearity, there is no heteroskedasticity, the residuals follow a normal distribution or show a bell curve distribution, the residuals do not show autocorrelation in a given period of time and the parameter of the linearity, as well as the mean value of the observations, is equal to the mean of the fit.

The following data will be used as estimation:

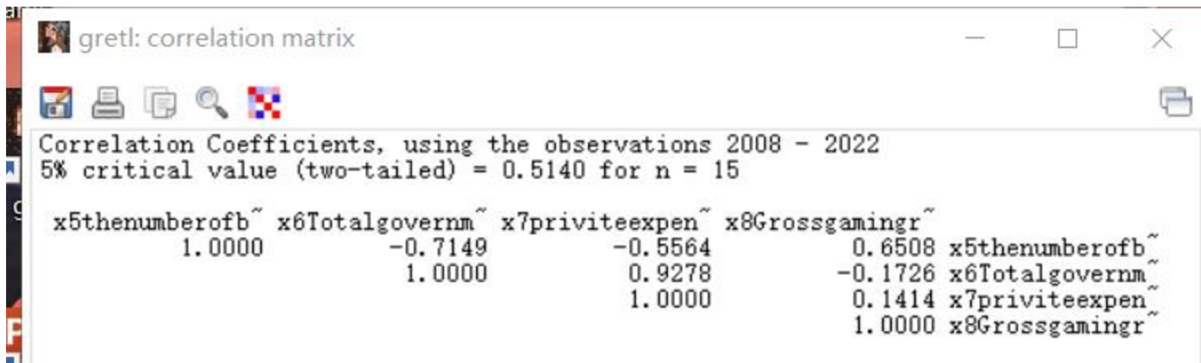
Figure 15 linear regression dataset for tax revenues

year	Total government revenue (millions of MOP) y2	the number of beneficiarie(using Cheque Cashing) x5	Total government expenditure (millions of MOP) x6	Privite consumption expenditure(million mop) x7	Gross gaming revenue (million mop) x8
2008	62 259,30	458 114	30 443,4	47,376	108,772
2009	69 870,90	464 414	35 459,9	48,937	119,369
2010	88 488,10	484 091	38 393,9	53,560	188,343
2011	122 972,30	503 483	45 593,3	63,065	267,867
2012	144 994,50	516 365	56 737,5	71,279	304,139
2013	175 949,30	527 610	51 388,6	80,458	360,749
2014	161 861,00	533 173	67 078,3	89,713	351,521
2015	116 111,50	479 380	80 753,8	95,246	230,84
2016	110 501,90	465 649	82 629,1	96,051	223,21
2017	126 366,70	412 899	77 692,7	99,252	265,743
2018	141 313,20	368 097	83 030,3	106,214	302,846
2019	140 730,20	332 472	84 683,4	110,890	292,455
2020	101 670,40	296 740	96 127,0	94,380	60,441
2021	94 810,60	236 112	89 153,1	103,737	86,863
2022	104 486,50	206 179	99 586,6	98,271	42,198

Source: own processing based on Macao Statistics Bureau and Macao Special Administrative Region Government, 2022

Here is the test for multicollinearity:

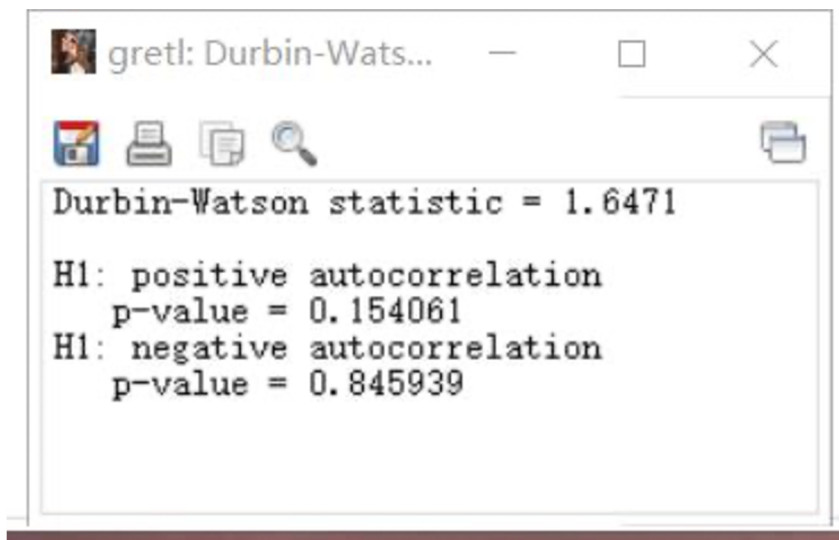
Figure 16 correlation matrix for second equation



Source: own processing based on Macao Statistics Bureau and Macao Special Administrative Region Government, 2022

From this, it can be known that there is no multicollinearity between the independent variables except the correlation between X6t and X7t, and the value of the correlation matrix is less than 0.75. However, the author would like to test if the linear correlation of this group will bring a great influence on the model. Therefore, the correlation between these two variables will be tested by Gretl using the Durbin Waston-test, as shown in Figure.

Figure 17 Durbin Watson test for variable X6t and X7t



Source: own processing based on Macao Statistics Bureau and Macao Special Administrative Region Government, 2022

From the above figure, we can see that the statistic of DW-test is 1.6471, which is closer to 2 than to 0. Therefore, although there is a certain linear correlation, it does not have a great influence on the model, and the two independent variables can be retained.

Figure 18 estimated parameter for second equation

	coefficient	std. error	t-ratio	p-value	
const	105529	48532.7	2.174	0.0548	*
x5thnumberofben	-0.142268	0.0849790	-1.674	0.1250	
x6Totalgovernment	1.64284	0.709431	2.316	0.0431	**
x7privateexpendi	-1638.58	881.733	-1.858	0.0928	*
x8Grossgamingrev	456.097	96.4129	4.731	0.0008	***

Mean dependent var 117402.4 S.D. dependent var 32185.66

Source: own processing based on Macao Statistics Bureau and Macao Special Administrative Region Government, 2022

The coefficients are:

$$y_{2t} = 105529 - 0.142x_{5t} + 1.642x_{6t} - 1638.6x_{7t} + 456.1x_{8t} + \varepsilon_2 \quad (4)$$

The effect of the independent variable on the dependent variable can be known from the coefficient of the independent variable:

- The number of beneficiaries (cheque cashing) do not have a significant effect on the tax revenues of Macau, which can be known from the p-value of (5). It has a p-value equal to 0.125, which is much greater than 0.05. The conclusion to be drawn from the first equation is that the impact of beneficiaries on labor force participation is very small, and thus the proportion of those affected by the WPS who choose to enter the labor market is small, and the impact on government tax revenues is not significant.
- When total government expenditure increases by 1 unit, government tax revenue increases by 1.64 units. This is the same as expected.
- When private consumption expenditure increases by one unit, tax revenue decreases by 1,638.58 units. This is not the same as expected either. It may be related to the

specificity of Macao's consumption tax, the current economic environment, and the economic structure.

- When gross gaming revenue increases by 1 unit, tax revenue increases by 456.1 units. This is in line with expectations.

Overall, there are some results that are beyond the author's expectations, but the model is still economically logical in the context of Macau's particular situation.

The next step is about the mathematical verifications, the mean value of the fitted dependent variable is compared with the observed value of the dependent variable, and both are equal to 117492.4, which mathematically shows that the model is correctly constructed.

A series of statistical parameters are also listed below for statistical validation:

Figure 19 statistical characteristics of the model for second equation

Mean dependent var	117492.4	S.D. dependent var	32185.66
Sum squared resid	1.50e+09	S.E. of regression	12236.76
R-squared	0.896752	Adjusted R-squared	0.855453
F(4, 10)	21.71362	P-value(F)	0.000064
Log-likelihood	-159.4261	Akaike criterion	328.8522
Schwarz criterion	332.3924	Hannan-Quinn	328.8145
rho	0.366713	Durbin-Watson	1.259133

Source: own processing based on Macao Statistics Bureau and Macao Special Administrative Region Government, 2022

From the coefficient of determination in the above figure, it is known that 89.6 per cent of the variation in tax revenues can be explained by the variation in the selected independent variables, which is not a bad result and shows that these variables explain the dependent variable to a high degree. From the above figure, it is known that the value of Adjusted R-squared is 0.855, which is like the value of R-squared, and the fit of the second model is also good.

Then comes the verification of the F-value and P-value:

The F-value is about 21.71, which is also a good value.

Here is the F test, this helps the author to determine if the model is statistically significant:

- $H_0: \alpha_5 = \alpha_6 = \alpha_7 = \alpha_8 = 0$
- $A=0.05$
- F-test
- $P=0.000064$

- $0.000064 < 0.05$ = at 5% significance level

The results indicate that the model can reject the null hypothesis where at least one of the independent variables has a statistically significant effect on the dependent variable.

The following statistical verification was carried out for the independent variables and t-tests were performed in the table:

Table 9 t-tests for second equation

H0: $\alpha_5 = 0$	H0: $\alpha_6 = 0$	H0: $\alpha_7 = 0$	H0: $\alpha_8 = 0$
A=0.05	A=0.05	A=0.05	A=0.05
P=0.125 > 0.05	P=0.0431 < 0.05	P=0.09 > 0.05	P=0.0008 > 0.05
RESULT: The null hypothesis cannot be rejected, X5t is not significant at 5% significance level.	RESULT: The null hypothesis can be rejected, X6t is significant at 5% significant level.	RESULT: The null hypothesis cannot be rejected, X7t is not significant at 5% significance level.	RESULT: The null hypothesis can be rejected, X8t is significant at 5% significant level.

Source: own processing based on Macao Statistics Bureau and Macao Special Administrative Region Government, 2022

Overall, two of the independent variables are not significant at the 5 per cent significance level, while the others are significant.

Finally, regarding the econometric verifications, the results will be based on Gretl's three separate tests:

Figure 20 econometric tests for second equation

```
White's test for heteroskedasticity -  
Null hypothesis: heteroskedasticity not present  
Test statistic: LM = 11.5839  
with p-value = P(Chi-square(8) > 11.5839) = 0.170756  
  
Test for normality of residual -  
Null hypothesis: error is normally distributed  
Test statistic: Chi-square(2) = 5.99828  
with p-value = 0.0498299  
  
LM test for autocorrelation up to order 1 -  
Null hypothesis: no autocorrelation  
Test statistic: LMF = 1.57199  
with p-value = P(F(1, 9) > 1.57199) = 0.241506
```

Source: own processing based on Macao Statistics Bureau and Macao Special Administrative Region Government, 2022

Test for heteroscedasticity:

- H0: heteroskedasticity is not present.
- $\alpha=0.05$
- $P=0.17>0.05$
- RESULT: H0 is not rejected. NO heteroskedasticity.

Test for normality:

- H0: error is normally distributed.
- $\alpha=0.05$
- $P=0.0498<0.05$
- RESULT: H0 is rejected. Normality of residual isn't present.

Test for autocorrelation:

- H0: autocorrelation is not present.
- $\alpha=0.05$
- $P=0.242>0.05$
- RESULT: H0 is not rejected. No autocorrelation.

Overall, this p-value is less than 0.05 but very close to it, although the null hypothesis is rejected in the test of normality of the residuals. So, it can be said that the model probably follows all the assumptions of linear estimation.

4.3. Limitations of the models

Firstly, the authors acknowledge that there are limitations in terms of data; the data collected for this thesis only covers 15 years (from 2008 to 2022) and using this timeframe alone to analyse an ambitious proposition in depth is clearly insufficient. In addition, data collection and recording methods may vary over time, which may affect the uniformity and validity of the data.

In the first equation, the author has considered other independent variables such as the amount of money residents receive each year under the WPS policy - a more intuitive measure of the impact of the WPS on individual residents, and therefore on the labour market. Then there is the gross annual income per capita of local residents- the funds received by residents in their gross annual income includes the funds provided by the WPS, this variable can clearly measure whether people will choose to join the labour market after receiving the funds from the WPS or not. In theory these variables can explain the dependent variable very well, but when actually building the linear regression model, it was found that the inclusion of these two variables leads to a p-value greater than 0.05 for each of the independent variables, meaning that each of the independent variables has no effect on the dependent variable at the 5% level of significance and that the funding from the WPS has a linear effect on the per capita gross annual income of local residents.

In the case of the second equation, the author has considered the effect of the number of employments of youth (16-29) on tax revenues, and the author's intention was to explore whether the youth of Macao would be affected by an increase or decrease in the number of people in the labour market after receiving funds from the WPS. GDP and GDP growth have also been considered to explore the impact of GDP or GDP growth on Macau's tax revenue in the context of WPS. But in the end, it was not included in the equation for the same reason as in the first equation and would have resulted in p-values much larger than 0.05 for most variables. The variable Total amount of Cheque Cashing appeared in the first equation and was not included in the second equation because it had a large linear effect with private consumption expenditure.

5. Results and Discussion

5.1. The results and discussion of the first model on the labour market

Firstly, the model adheres to all the assumptions of linear estimation; secondly, the f-test on the model shows that at least one of the independent variables has a statistically significant effect on the dependent variable and the model is mathematically very well fitted; and then with regard to the level of significance of the independent variables on the labour force participation rate, the number of beneficiaries (cheque cashing) and the total amount of money (cheque cashing) have a significant impact on the labour force participation rate, and the number of tertiary education students has a less positive and significant impact on the labour force participation rate.

It can be known from here that in the Macau example, this similar UBI policy would have a small positive impact on the Macau labour market. It can be known in the previously mentioned Indian example that unconditional basic income can bring in more labour because UBI makes people interested in small scale investments.

Regarding the example of UBI in Kenya (Banerjee *et al.*, 2023) it can be learnt that the beneficiaries did not appear to be lazy, but rather it gave them an entrepreneurial spirit. This increased jobs and gave more people the option to enter the labour market. In the Korean Youth Basic Income Programme, it is known that the young people said that this fund gives them the right to choose to quit their temporary jobs to improve their skills or to continue their studies and their willingness to work is not diminished (Fan Li, 2021). From all these examples UBI gives people more choices, they can start their own business or improve themselves if they so choose. So UBI also gives the young people the bottom line to pursue their studies. Ruud Muffels and Erwin Gielens (Delsen, 2019) argue that the Unconditional Basic Income policy may bring people the freedom of choice. Going back to the example of Macao, although the amount of WPS is relatively small, it may still indirectly promote people to pursue higher education, thus positively affecting the labour market. More people participating in tertiary education will result in more talented people bringing more innovation and possibilities to the society, which in turn can contribute to economic growth.

5.2. The results and discussion of the second model on tax revenues

From the results, firstly, the model probably complies with all the assumptions of linear estimation; secondly, the f-test of the model shows that at least one of the independent variables has a statistically significant effect on the dependent variable, and the model is mathematically very well fitted; and then, regarding the significance of the independent variables on the tax revenues of Macao, Two of the four independent variables have a significant positive effect on Macau's tax revenues, which are the total government expenditures and the annual gross revenues of the gaming industry in Macau.

Logically, an increase in the number of WPS beneficiaries will positively affect total government revenues to some extent, the other UBI examples from the previous section can be shown that people have more choices when they get extra money, their income increases and they can choose to increase their consumption, learn more skills or start their own business, etc., then there will be more demand for production by businesses, and society will have more talented people and jobs, thus affecting tax revenues. This is a positive side, but there is also a negative side. It has also been mentioned earlier that the implementation of the WPS has led to an increase in the Government's public expenditure every year. It has been argued that one of the disadvantages of unconditional basic income is that it can put a lot of pressure on the government's public spending (Habermacher and Kirchgässner, 2013).

Surprisingly, one of the most important variables, the number of beneficiaries of WPS (cheque cashing), has no significant effect on Macau's tax revenue. Another variable with no significant effect is the private consumption expenditure of Macao residents.

Based on the Youth Basic Income Scheme in South Korea it can be known (Fan Li, 2021) that businesses are very much in agreement with the implementation of the scheme as it will make them more profitable. This means that the consumption needs of the beneficiaries are also increasing and of course they need to pay more consumption tax. And with the increase in the earnings of the business, the tax to be paid will also increase. But it varies from region to region or country to country.

"Cross-Strait, Hong Kong and Macao Consumer Confidence Index" can show that the Consumer Confidence Index of Macao has never been higher than 100 from the fourth quarter of 2009 to the fourth quarter of 2022. Below 100 means that the residents have no consumer confidence (AUST, 2022). This shows that people are always in a tight spot in the current economy. Even though the number of beneficiaries of the WPS has increased, the

amount of the WPS is too small, and the amount per capita per month is less than the minimum subsistence index for a one-person household in Macau, which has very little effect on boosting consumption, as Macau implements a low-tax system and the excise tax is only levied on imported cigarettes and alcohol, so the tax paid by people for their consumption accounts for a very small amount of the total amount of the tax.

As can be seen from the previous model, the WPS can indirectly contribute to an increase in the number of people in tertiary education, as well as directly having a smaller positive effect on the labour market thereby increasing employment and personal income tax. However, from the second model, it can be proved that the impact of the gross income of the gaming industry on Macau's tax revenue can be very large, combined with the previously mentioned that there is no primary industry in Macau, there are only secondary and tertiary industries, which is dominated by the tertiary industry - the service industry, of which the tourism and gaming industry contributes almost half of Macau's GDP and tax revenues, which leads to the monotonous nature of Macau's industry. Some scholars have found that Macau's unbalanced industrial structure leads to economic volatility, which in turn leads to Macau's inability to diversify well (Liu and Lin, 2024). Therefore, a single industry will lead to fewer jobs, and even if higher education talents have more creativity and innovation, the unbalanced industrial structure will restrict them from utilizing their talents.

6. Conclusion

Based on the results of the analysis of the first model it is known that it follows all the assumptions of linear estimation. Therefore, the independent variables can explain the effect on the dependent variable. And then regarding the significance of the independent variables on the labour force participation rate, the number of beneficiaries (cheque cashing) and the total amount of money (cheque cashing) have a significant effect on the labour force participation rate, and the number of students in higher education has a less positive and significant effect on the labour force participation rate, but Macao's GDP has no significant effect on the labor force participation rate. It is also inferred that during the 15 years of WPS implementation (2008-2022), the labour market in Macao is positively affected by the number of beneficiaries (cheque cashing), the total amount of WPS (cheque cashing), and the number of higher education students to a lesser extent. This has brought certain benefits to the Macau labour market, as the increase in the number of WPS beneficiaries and the amount of money received has given residents the possibility of other jobs. Moreover, under the influence of the WPS, students who receive the funds choose to continue their studies, and in the long run, after graduation, students return to the labour market with better skills, which not only increases the labour force participation rate but also may lead to innovation.

Based on the results of the second model, it can be known that the independent variables are significant for the Macau tax revenue, the total government expenditure of Macau and the annual gross revenue of the gaming industry have a significant positive impact on the Macau tax revenue. However, Macau government tax revenue is not affected by WPS and private final consumption expenditure. The implementation of this policy by the Macau government in 2008 did enable Macau residents to enjoy the fruits of economic development and alleviate the pressure of living brought about by inflation, so the Macau residents had a very favourable opinion of the government, but the implementation of the WPS in the latter part of the time until 2022 did not bring much benefit to Macau, but rather increased the pressure of public expenditure. And consumer confidence in Macau has not improved since the implementation of the WPS.

Overall, the implementation of the WPS did bring some benefits to Macau, such as an increase in per capita income and a small but positive impact on the labour market. However, because of the unitary nature of Macao's industries and the special nature of its

tax system, WPS has brought more pressure to the government, such as increase in projected expenditures for WPS.

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7.3. List of equations

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7.4. List of abbreviations

UBI-----Unconditional Basic Income
WPS----- Wealth Partaking Scheme