Proceedings of Business and Economic Studies, 2026, Volume 9, Issue 10
https://bbwpublisher.com/journal/PBES
Online ISSN: 2209-265X
Print ISSN: 2209-2641

Research on the Feasible Paths of the Cross-Regional Time Bank in the Guangdong-Hong Kong-Macao Greater Bay Area: From the Perspectives of Pricing, "Deposit First, Withdrawal Later" Model, and Industrial Synergy

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Abstract: The time bank is a mutual-aid eldercare model with service exchange as the core, through the younger helping the older. This new model can effectively revitalize the value of the elderly group and promote the sustainable development transformation of the eldercare model from passive acceptance to active participation. Under the background of the integration of the Guangdong-Hong Kong-Macao Greater Bay Area, the complementary differences in aging and eldercare resources among the three places provide a realistic basis for the innovative practice of the cross-regional time bank, which is helpful in promoting the interconnection and sharing of eldercare service resources between Guangdong, Hong Kong, and Macao. However, due to difficulties in cross-regional scenarios, such as the lack of a fair pricing model for time points, the lack of attractiveness of the "deposit first, withdrawal later" model, and the lagging synergy with the silver economy industry, the time bank has not yet been applied in cross-regional contexts within the Greater Bay Area. Therefore, this paper systematically designs the specific operational mechanisms of cross-regional time banks around the dimensions of pricing, the "deposit first, withdrawal later" model, and industrial synergy. The aim is to provide a reference for improving the cross-regional eldercare service system in the Greater Bay Area and establishing a nationwide cross-regional mutual-aid eldercare system, thereby transforming mutual-aid eldercare from a local pilot into interconnected collaborative cooperation.

Keywords: Cross-regional; Time bank; Pricing; "Deposit first, withdrawal later" model; Industrial synergy

Online publication: November 16, 2026

1. Research background and significance

1.1. Research background

Currently, it is a crucial period for deepening China's strategy to address population aging. Faced with the contradiction that while the elderly population is mainly composed of young healthy groups, the potential for their social participation and the development of their human resources has not been fully released, the *Outline of the 15th Five-Year Plan for National Economic and Social Development of the People's Republic of China* emphasizes that it is necessary to actively develop the human resources of the elderly, thoroughly implement the "Silver Age Action," and promote mutual assistance-based eldercare services. This indicates that the sustainability of the eldercare system cannot rely solely on the basic guarantees provided by the state; it also requires revitalizing the value of the young healthy elderly group and promoting the transformation of the eldercare model from passive acceptance to active participation.

In recent years, the Guangdong-Hong Kong-Macao Greater Bay Area (GBA) has continued to deepen cross-regional eldercare cooperation under policy guidance and market-driven, and the trend of Hong Kong and Macao residents going to the mainland for eldercare has increased. Against the background of significant differences in aging and eldercare resources among the three places, the GBA aligns with the direction of actively developing the value of the elderly group advocated by the "15th Five-Year Plan." First, there are significant differences in the degree of aging among the three regions. By the end of 2025, the proportion of people over 65 years old in Hong Kong and Macao was 24% [1] and 15.3% [2] respectively, while that in Guangdong Province was only 10.28% [3]. Hong Kong and Macao have a great demand for eldercare services, while Guangdong has a relatively abundant low-aged elderly group, whose time and skills can be transformed into the supply of care services for the old-age elderly in Hong Kong and Macao. The complementary relationship between supply and demand of eldercare services among the three places provides a realistic foundation for cross-regional eldercare cooperation in the GBA and offers a feasible path for revitalizing the value of the elderly group. Second, the existing cross-regional eldercare policies such as the "Residential Care Services Scheme in Guangdong," the "Elderly Health Care Voucher GBA Pilot Scheme," and the "Hong Kong-Macao Drug and Medical Device Access" mainly focus on institutionalized commercial services. However, there is still a lack of effective channels to match supply with demand for daily cross-regional eldercare services such as medical escort, companion care, and temporary care. These "soft services" are the dominant areas of local young healthy elderly groups in Guangdong.

The time bank is a mutual-aid eldercare model that uses time as a general equivalent. Its basic logic is "storage and exchange of service time," meaning that participants (primarily low-aged elderly group and volunteers) earn time points by providing eldercare services to the elderly, and later exchange these equivalent time periods for eldercare services or equivalent goods, thereby achieving an intertemporal allocation of eldercare resources. Essentially, it is a sustainable circular eldercare model of "helping the elderly with the elderly" and an important part of the diversified eldercare service system. This model has been strongly supported by both the central and local governments. The General Office of the State Council clearly pointed out in the *Opinions on Promoting the Development of Eldercare Services* that it is actively exploring the mutual-aid eldercare model of time banks. The Ministry of Civil Affairs further proposed in the *Opinions on Promoting the Development of Mutual-Aid Eldercare Services* to explore the establishment of mechanisms for time point management, cross-regional deposit and withdrawal, and time point transfer. Currently, time banks have spread across numerous provinces and cities across the country, including Beijing, Shanghai, and Guangdong Province.

If the time bank is applied to the cross-regional eldercare scenario in the Guangdong-Hong Kong-Macao GBA, the scattered time and skills of the young healthy elderly can be transformed into mobile eldercare service resources through time points, which can not only solve the supply-demand contradiction in cross-regional eldercare, but also release the potential value of the young healthy elderly as social resources.

1.2. Research significance

From the theoretical perspective, this paper is the first to expand the application scope of time banks from a single district or city to cross-regional scenarios in the Guangdong-Hong Kong-Macao GBA. There are a few studies on the exploration of cross-regional deposit and exchange of time banks [4,5], but they are limited to the collaboration between domestic cities. It has not yet studied how the economic and policy differences in the Guangdong-Hong Kong-Macao GBA affect the promotion and operation of the cross-regional time bank under the background of "One Country, Two Systems." This paper incorporates the characteristic differences among the three places into the analysis framework of the cross-regional time bank, providing theoretical innovation for the institutional design of cross-regional mutual-aid eldercare in the GBA.

From the practical perspective, this paper focuses on the cross-regional scenarios in the Guangdong-Hong Kong-Macao Greater Bay Area, providing specific operational mechanism designs for the cross-regional time bank in terms of pricing, "deposit first, withdraw later" model, and industrial synergy. In the pricing dimension, the regional time point multiplier pricing system is constructed based on the economic development levels of the three places to fairly measure the value of cross-regional time points, and the circulation rules of time points are set to prevent cross-regional arbitrage. In the "deposit first, withdraw later" model dimension, the difficulty of the "deposit first" part is reduced by lowering the usage threshold of the time bank and expanding access to welfare resources, and the uncertainty of the "withdraw later" part is reduced by establishing institutional guarantees and allowing time points to be converted into cash compensation. In the industrial synergy dimension, it encourages the platform to collaborate with enterprises in the silver economy industry and provides fiscal policy support to promote the high-quality development of the silver economy.

From the policy perspective, the cross-regional time bank model proposed in this paper in the Guangdong-Hong Kong-Macao Greater Bay Area has generated experience in coordinating mutual-aid eldercare across the three places. This experience can inform the development of mutual-aid eldercare services across regions in China and provide institutional guidance for a national time bank platform. Such a platform could promote more consistent operating standards and connect local initiatives, helping the national mutual-aid eldercare system move beyond isolated local pilots toward coordinated interregional cooperation.

2. The current development status of time banks in the GBA

2.1. The development of time banks in Hong Kong and Macao

Hong Kong is relatively advanced in the exploration of time banks. It is mainly led by the elderly centers of social services, most of which are community-based and intended to build a community neighborhood support network. The mechanisms of Hong Kong's time banks are relatively standardized. For example, the "Si Si Fan Hoeng (Always Sharing) Time Bank" in Wong Tai Sin District [6] is established by the "Yang Memorial Methodist Social Service," and has branches in three areas of San Po Kong, Kingsford Terrace and Choi Hung Estate. Each branch develops a distinctive focus according to the characteristics of its community. Based on mutual-aid eldercare, the San Po Kong branch also caters to women and children in the community

and expands the scope of mutual aid to different age groups. The Kingsford Terrace branch focuses on leveraging the expertise of the elderly group and encourages them to actively participate in the time bank and volunteer activities. The Choi Hung Estate branch combines time bank with volunteer service to promote the transformation of the volunteer service model. The three branches all center around the core concept of "mutual aid, mutual learning, and mutual sharing," and through diversified activities promote the circulation of time bank points and achieve the sustainable operation of time banks. In addition, Hong Kong's time banks also receive cross-sector support from universities. The team from the University of Hong Kong designed and developed the "HINCare" institutional management platform and user mobile application, utilizing artificial intelligence technology to facilitate online matching of supply and demand among users. After its launch, it has responded positively. By 2024, it has accumulated over 10 million time points, reflecting that Hong Kong's time banks have a significant scale of participation and a strong community foundation.

To alleviate the pressure of eldercare in society, Macao has carried out explorations of cross-regional eldercare cooperation such as "Guangdong-Macao Pension Link+" and "Macao New Neighborhood" Elderly Service Center in Hengqin. However, the time bank is still in the stage of concept discussion in Macao, and no pilot projects have been launched.

2.2. The development of time banks in Guangdong Province

Guangdong Province is one of the earliest provinces in China to implement the time bank mutual-aid eldercare model, with time bank sites established in many cities. As the provincial capital city, Guangzhou was the first city to conduct the practice of the time bank in the province and currently has a relatively mature operation mechanism. The government has issued a special work plan for the time bank. The government has issued a special work plan for the time bank, which is led by the Guangzhou Civil Affairs Bureau to release the *Work Plan on Establishing the Guangzhou "Time Bank" Eldercare Volunteer Service Mechanism*. The plan constructs a four-level management system of "city-district-town(street)-community," categorizes eldercare services into general and specialized types, formulates standardized procedures for ordering and accepting tasks on the online platform, and clarifies the diversified ways of using time points. These measures have enabled time banks to form a relatively complete operational system. According to the *China Time Bank Development Research Report* [7] released by Peking University and the Chinese Red Cross Foundation, "Nansha Time Bank" is the earliest established time bank in Guangzhou and is dominated by the Nansha District government. It covers towns (streets) and communities in the form of "management center + community service station" and is equipped with full-time staff to ensure daily operation. This time bank has a relatively complete service matching mechanism. The service process details and standardizes multiple dimensions, such as membership level, service type, and satisfaction evaluation system, promoting the scientific operation of the time bank. During the 8 years of operation, it has accumulated more than 89,000 services. In addition, Nansha District also includes the service duration of time banks in the evaluation indicators of Party branches, and the time points obtained are all returned to the platform to maintain operations or donated to those in need, representing the combination of public services and social responsibility.

The time banks in Shenzhen are mostly established by the District Civil Affairs Bureau or street communities, and there are significant differences in the operation models. For example, Yantian District has carried out time bank practice through the "internet + eldercare service" model and has collaborated with third-party social welfare organizations to alleviate the shortage of professional eldercare services in the community.

The time bank of Tianxin Community in Sungang Street, Luohu District focuses on the "volunteer service +" model and uses the time bank as a platform to improve community governance and service levels. Besides the government-led time banks mentioned above, there are also time bank practices based on the hospital platform. The Eldercare Volunteer Association of Nanshan District jointly established the "Care Volunteer Service Time Bank" with Shenzhen Nanshan Hospital, where young healthy elderly volunteers provide eldercare services to elderly inpatients.

Compared with Guangzhou and Shenzhen, Zhuhai's time banks are still in the exploratory stage. They are primarily based on streets or communities and have been piloted in a few areas such as Meihua Street, Hongli Community in Fengshan Street, and Xincun Community in Cuixiang Street. Regarding this initial development situation, the Zhuhai Civil Affairs Bureau has allocated special funds to actively promote the practices of time banks in each district.

3. Potential challenges faced by the cross-regional time bank in the GBA

3.1. Cross-regional time points are difficult to be priced fairly

At present, time banks generally follow the basic pricing principle of equivalent hours for exchange. They usually operate within a single district or city, where the cost of time is roughly similar. However, the cross-regional time bank in the GBA involves economic differences among the three places. In the market value of the eldercare service industry, the salary statistics as of 2024 show that Hong Kong and Macao are 16,700 HKD [8] and 16,980 MOP [9] respectively, the mainland with higher labor costs in Shanghai as an example for the 5,605 RMB [10]. If the cross-regional time bank implements the deposit and withdrawal based on traditional equivalent hours, the actual market value gap represented by each hour of time points between the three places can be as high as three times. This may lead to the phenomenon of speculative arbitrage of cross-regional time points; that is, under the condition that platform points can be transferred or donated, points can be obtained or acquired at a lower cost through the Guangdong side and then sold to the Hong Kong and Macao sides to exchange for high-value eldercare services or goods, which seriously damages the fairness of the cross-regional time bank. On the contrary, if the Hong Kong and Macao sides go to the Guangdong side for deposit and withdrawal, under the same circumstances, the labor cost of each hour of points can be converted into approximately 3 hours of direct purchasing power in the Guangdong eldercare service market, but it can only be exchanged for an equivalent 1 hour of service on the platform. This unequal, low cost-effectiveness cross-regional time point deposit and withdrawal model has a negative impact on the willingness of participants.

3.2. The "deposit first, withdrawal later" model of cross-regional platform lacks attraction

In the "deposit first" dimension, the pension welfare systems in Hong Kong and Macao are relatively sound. In addition to the Mandatory Provident Fund (MPF) of the retirement savings system, the elderly in Hong Kong also receive the Old Age Allowance issued by the government. Similarly, Macao's elderly enjoy the Old-age Pensions and the Subsidy for Senior Citizens. These benefits can be used directly to purchase eldercare services and goods. For these groups with strong payment capabilities and accustomed to mature market-oriented supply, the time cost of the "deposit first" model raises the access threshold of the cross-regional time bank compared with immediately available welfare resources. This makes the cross-regional time bank lack the competitiveness of immediate availability, and the elderly prefer to choose eldercare services from commercial institutions. In the "withdrawal later" dimension, risks such as changes in cross-regional policies and the survival of the platform lead to the uncertainty that time points become invalid and cannot be exchanged. The

cross-regional time bank in the GBA involves participants from three places. Under the background of "One Country, Two Systems, and Three Legal Systems," there are significant differences in the attributes of time points, the protection of account privacy data, and the guarantee of funding sources among different places. Due to the involvement of participants from three places, even if there is an official compliance change in any of the above factors in one place, it will directly affect the final redemption rights of the platform's time points, thus weakening the attractiveness of the cross-regional time bank.

3.3. The synergy between cross-regional platform and silver economy industry lags behind

The applicable scope of time bank points for exchange has developed from the early stage based on public welfare, where services were exchanged for services, to the current model that introduces market-based incentive methods, where services are exchanged for goods. However, most of the types of commodity exchange are relatively limited, mainly for general-purpose supplies such as daily necessities [11], lacking the characteristics of the silver economy industry. In the GBA, Hong Kong and Macao have abundant capital, while core Pearl River Delta cities such as Guangzhou, Shenzhen, and Dongguan have advanced technological innovation capabilities, and cities like Foshan and Zhongshan have mature manufacturing foundations. The entire GBA is actively promoting the establishment of a silver economic industrial ecosystem. As a platform that can aggregate resources of the elderly in the GBA, the synergy between the cross-regional time bank and the silver economy industry is lagging. Although the three places have rich silver economy resources, the platform has failed to play the role of integrating the user demands for silver product consumption and the enterprise supply in the silver economy market, and it is difficult to effectively drive the development of the silver economy industry in the GBA.

4. Feasible paths for the cross-regional time bank in the GBA

4.1. Establishing rules for fair pricing and circulation of cross-regional time points

To ensure that the time points of the cross-regional time bank can be successfully deposited and withdrawn within the GBA, it is necessary to carry out regional pricing according to the economic development of Guangdong, Hong Kong and Macao. The conversion of points between the three places should comprehensively reference macro indicators that reflect currency exchange rates, residents' economic levels, and the development of the eldercare industry, such as currency exchange rates, per capita disposable income, consumer price index, and the average salary in the eldercare service industry [12]. After determining the weights according to their influence on the purchasing power of time points, calculate the regional time point multipliers to ensure that the hourly points of each place can fairly represent their actual market value.

Furthermore, the cross-regional time bank also needs to improve the management of time point circulation to limit cross-regional arbitrage. First, it can strengthen the verification and management process of time points based on the intergenerational family point model currently implemented by most time banks. For example, allowing the transfer or donation of points between family members after identity verification, and setting the upper limit of points flow between accounts within specific time periods (such as each year). This would effectively achieve intergenerational mutual aid while reducing the possibility of points being used for illegal profit-making. Second, it is necessary to strictly regulate the exchange of points for cross-regional elderly care services, especially the cross-regional exchange of eldercare services with significant market value differences in three places. For special circumstances such as going to the mainland for eldercare, relevant entry and exit records or mainland medical records should be provided for review to prove the authenticity and

appropriateness of the purpose. This is not only conducive to achieving the goal of flexible mutual-aid eldercare in the GBA, but also to maintaining the balanced allocation of eldercare service resources in each region.

4.2. Improving the "deposit first, withdrawal later" model of cross-regional adaptation

The "deposit first, withdrawal later" model of time banks not only embodies the principle of public welfare, but also effectively promotes the sustainable development of mutual-aid eldercare. On this basis, it should continue to improve its application to adapt to cross-regional scenarios, forming a "deposit first, withdrawal later" model with characteristics of the GBA. In the "deposit first" stage, elderly users can receive limited time points from government subsidies after registering with real-name authentication. By offering the first free experience, the entry threshold of the cross-regional time bank in the GBA can be lowered. Moreover, to promote the connection between the cross-regional time bank and the pension welfare system of the GBA, the governments of the three places can relax restrictions on the use of pension welfare resources [13], allowing monetary pension allowances to be directly used to offset part of the time points. The setting of the offset ratio can refer to the age-based tiered model. According to the "Age Division and Naming of Chinese Silver-haired People" released by the China Association of Gerontology and Geriatrics, the elderly are divided into silver-haired youth, silver-haired middle-aged, silver-haired elderly, and long-lived elderly groups at the critical points of 65 years old, 75 years old, and 90 years old respectively. The higher the age of the elderly, the higher the demand for eldercare services; thus, the proportion of the pension allowance that can be used to offset time points should be gradually increased with the age range. Through the form of connecting with welfare resources, it reduces difficulties in the "deposit first" stage and enhances the participation incentives of the cross-regional time bank in the GBA.

In the "withdrawal later" stage, to reduce the uncertainty of point exchange brought by cross-regional operations, the government departments responsible for social eldercare services in Guangdong, Hong Kong, and Macao (such as the Civil Affairs Bureau of Guangdong Province, the Social Welfare Department of Hong Kong, and the Social Work Bureau of Macao) should jointly formulate relevant rules for the cross-regional time bank project. Especially for the above-mentioned parts where the differences among the three places are significant, the attributes of time points, the protection of account privacy data, and the guarantee of funding sources need to be further clarified, and contingency plans for time point liquidation at the time of platform termination under special circumstances should be made. In addition, it should be considered to upgrade the use of points from the more restricted form of only exchanging services or goods on the platform to a combination of discounted small cash rewards and platform exchange. The proportion of discounts can be set according to the accumulated time points in the user's account. Users with more time points can choose to discount a higher proportion of cash rewards, thereby increasing the flexibility in the "withdrawal later" stage and reducing the risk of uncertainty in points. Users with fewer points can have a lower discountable proportion, and the incentive model combined with cash rewards is used to increase users' enthusiasm.

4.3. Deepening the synergy between cross-regional platform and silver economy industry

To give full play to the role of the cross-regional time bank in integrating resources of the silver economy in the GBA, the synergy between the platform and the silver economy industry should be deepened. The General Office of Guangdong Provincial People's Government issued the *Implementation Plan for Promoting High-quality Development of the Silver Economy and Enhance the Well-being of the Elderly in Guangdong Province*, which clearly states that it is necessary to encourage the stimulation of the silver economy market through the active cooperation between enterprises and the platform side, and relying on the production factors and

industrial advantages of various regions to strengthen the industrial synergy of the silver economy in the GBA. The GBA cross-regional time bank platform can be synergized with enterprises in the silver industry to further expand the applicable scope of time bank point exchange. On the basis of the original, it can be expanded beyond eldercare services and general-purpose supplies to include diversified silver economy products with the regional characteristics of Guangdong-Hong Kong-Macao. Specifically, based on the advantages of mature capital markets, financial enterprises in Hong Kong and Macao could launch aging financial products on the platform, such as commercial endowment insurance; cities such as Guangzhou, Shenzhen and Dongguan will use scientific and technological innovation capabilities to carry out experience projects with the platform for smart health eldercare products, like health management intelligent devices; and traditional manufacturing cities such as Foshan and Zhongshan will provide daily eldercare products to the platform, including age-friendly furniture. This will not only meet the silver product consumption demand of the elderly user groups but also help expand the silver economy market in Guangdong, Hong Kong and Macao, and deepen the industrial synergy of the silver economy in the GBA through the cross-regional time bank platform.

In addition, enterprises in the silver industry that cooperate with the cross-regional time bank should be supported by fiscal policies to enhance their enthusiasm for accessing the platform. Although the GBA has implemented tax incentives for non-profit organizations such as eldercare facilities to optimize the development environment for the silver economy, these policies have not fully covered the above-mentioned silver industries with Guangdong-Hong Kong-Macao characteristics. The access of enterprises in the silver industry has enhanced the attractiveness of the cross-regional time bank to a certain extent, indirectly increasing the level of this public welfare platform to alleviate the pressure of the aging society in the GBA. Therefore, the government can appropriately adopt measures such as financial subsidies or tax incentives to encourage relevant enterprises to cooperate with the platform. By strengthening the synergy between cross-regional platforms and the silver economy industry through policy guidance, it is helpful to promote the high-quality development of the silver economy in the GBA.

5. Conclusion

As a new type of mutual-aid eldercare model based on service exchange, the time bank aligns with the current reality of population aging differences and the deepening cross-regional eldercare cooperation in the GBA. The cross-regional time bank can help facilitate the interconnection of eldercare service resources among the three places and promote the cross-regional sharing of such resources. However, the economic and policy differences among Guangdong, Hong Kong, and Macao make the practical application of the cross-regional time bank difficult. Therefore, this paper systematically designs the operational mechanisms of the cross-regional time bank from three perspectives, including time-point pricing, the "deposit first, withdrawal later" model, and the synergy between the platform and the silver economy industry. Through the study of the feasibility of the cross-regional time bank in the Guangdong-Hong Kong-Macao GBA, this paper explores a development path for eldercare in the GBA that balances the public welfare mission and cross-regional adaptation and also provides a reference for China to build a mutual-aid cross-regional eldercare service governance system under the current situation of a deep aging society.

Disclosure statement

The authors declare no conflict of interest.

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