



ECONOMIC POLICIES IN THE AGE OF GLOBALISATION

EPOG STUDENTS AND ALUMNI ASSOCIATION

Use of wearables for health management in the aging population

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Aging has become a worldwide challenge with growing healthcare cost; longer lifespan and declining fertility rate caused the concern that the retired population with chronic disease will cause growing pressure for the social security system. By prediction, aging will incur 66% additional healthcare burden in China by 2030^{2 & 3} and in Europe cost 26.7% of GDP by 2070⁴. New technology emerging such as wearables can potentially help to monitor the health conditions, reduce healthcare costs for the old and enable them to build a community. To take care of the elderly, watches, bandits can detect falls and send out warnings to family members, friends or emergency help center; smart spoons, glasses can monitor nutrition intake and prevent osteoporosis; GPS tracking can give real time location of the elderly and help family members deal with patients with Alzheimer's disease and other dementia conditions.

1. AGING AND RISING HEALTHCARE COST

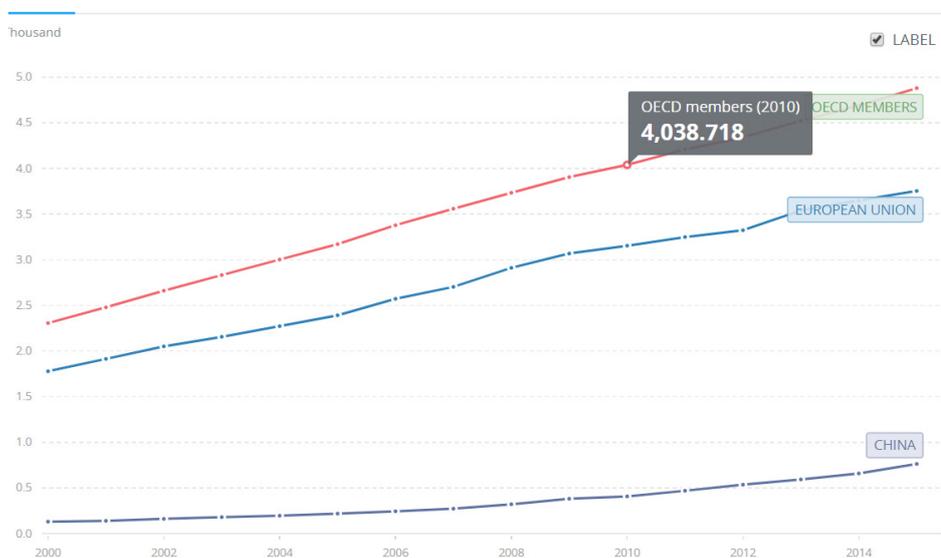
China and Europe are marching into the "age of aging", with the EU at more intensive pace. Life expectancy at birth in China has reached 76.3 years in total. Age dependency ratio/old in China (the percentage of population aged between 0-14 and 65+ as part of the working population) will jump to 44 % by 2050. The average life expectancy in the European Union at birth has reached 80.62 years in 2016. The Euro-

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pean Commission projected that, by 2050, the old age dependency ratio (the percentage of population aged 65+ as part of the working population) will rise from 30.45% in 2017 to 51.2% in 2070 (World Bank, 2019). More healthcare issues will arise from chronic conditions instead of acute conditions and injuries. Hypertension, obesity led diabetes and cardiovascular diseases today cause more deaths than cancer.

Healthcare costs are on the rise in the EU and in OECD member states. The global financial crisis in 2008 led to fiscal austerity policies where government cut public spending, thereafter reducing healthcare coverage and limiting access to healthcare (Stuckler D, 2017). As a result, the governments in Europe are struggling between austerity measures which cut government budgets and growing healthcare costs due to higher portion of the aging population with chronic diseases. With the healthcare budget tumbling and growing healthcare demand from the population, policy makers in Europe are trying to find a way to improve healthcare quality while taking control of healthcare budgets.

GRAPH 1:
CURRENT HEALTHCARE EXPENDITURES PER CAPITA, 2000-2015 IN OECD COUNTRIES, THE EU AND IN CHINA



Source: World Bank, 2019

2. ACTIVE MONITORING AND BARRIERS FOR IMPLEMENTATION

Wearables are electronic devices which can be body accessories, implants or get embedded in clothing or tattooed in the human skin. They can send and receive data about bio-metrics indicator via the internet⁵. By collecting large amount of data and

using algorithms to detect patterns, wearable devices made it easier to detect early stages of chronic diseases before the symptoms even appear (Kaminsky et al, 2016); To prevent chronic diseases, it is important to control parameters such as blood sugar, pressure, and cholesterol level. These parameters are closely linked to diets and exercises. With food nutrition analysis camera, for instance, it becomes easier for users to track food intake. With wearables performing workout coaching, monitoring VO2 level, and calorie burnt during each session, users may find it easier to track exercises patterns and change behavior if necessary. Patients with chronic conditions may find it much easier to adjust their treatment therapies, adapt to new lifestyles, and communicate with healthcare professionals and perform self-care.

Internet of Healthcare Things (IoHT) also makes it possible for doctors to provide better treatment with the established protocol and to monitor whether patients can follow the clinical pathway. The use of big data can improve the policy making process as it enables regulators to monitor the effects of new drugs and technology. It then becomes possible for social security fund administrators to decide the optimal clinical pathways to cover. Local health authorities also have the autonomy to determine what to focus on and to follow best practices (EIU, 2016). Implementing IoHT solutions for constructing the value based healthcare system can potentially lower healthcare cost, improve healthcare quality and efficiency.

The rapid adoption of such devices has motivated demand for intensive health monitoring functions. Apple Watch 4 for instance bolsters proactive health monitoring functions such as heart rate irregularities detection and sending users notifications for high, low heart rate, and irregular rhythms, and generates fall detection and emergency SOS function. Patients are engaged in more complex data sharing with connected devices and wearables, like generating ECG diagrams and sharing them with doctors. This gives patients more power to be engaged in their healthcare process. The type and amount of data provided by Apple Watch, Fitbit, Xiaomi Watch and other smart watches and bands can generate huge amount of machine-readable data unimaginable five years ago (McKinsey, 2013).

Table 1 describes the world's top 5 wearable brands and their health monitoring and coaching related functions. Most variables today have basic heart rate monitoring, sleep monitoring, and work out tracking or coaching, and have integrated VO2 monitors and vir-

tual assistants. Only Apple Watch has integrated fall detection, ECG diagram generator, nutrition tracking, stress management function, and other health related functions.

TABLE 1:
WORLD'S TOP FIVE WEARABLE BRANDS (BY SHIPMENT)
AND THEIR HEALTH/ WELLBEING RELATED FUNCTIONS

Manufacturer/ Fonction	Apple	Xiaomi	Fitbit	Huawei	Garmin
Fall Detection	X				
ECG Diagram Generation	X				
Heart Rate Monitor	X	X	X	X	X
Emergency SOS Call	X				
Meditation Coaching/Stress Management	X		X		X
Menstrual Period Tracking	X		X		
Glucose Tracking	X				
Nutrition Tracking	X				
Water Intake Tracking	X				
Workout Tracking and Coaching	X		X	X	X
Sleep Monitoring	X	X	X	X	X
Call & Text	X	X ⁶	X ⁷	X	X
GPS Tracking	X	X	X	X	X
VO2 Max Tracking	X	X	X	X	X
Wireless Music Play	X	X	X	X	X
Virtual Assistant	X	X	X	X	

Source: Apple, 2019; Xiaomi, 2019; Fitbit, 2019;
Huawei, 2019; Garmin, 2019;

3. BARRIERS

There are barriers, however, to implement IoHT solutions.

First, strict regulations for medical use leads to difficult commercialization of health related functions for wearables. Relevant approval usually takes 5-10 years depending on the country and specific function for approval. Some of the monitoring methods like pumping,

in blood pressure monitoring disturbs user sleep and therefore cannot be used for 24/7 monitoring. Still this is the only acceptable for the medical device regulator in China. New ways of monitoring blood pressure via PPG, however, cannot be commercialized due to strict regulations on medical use for bio-metrics data monitoring.

Second, most doctors do not recognize data collected via wearables or other IoHT devices at home.

Third, there are no national and regional level healthcare data sharing platforms in most healthcare systems.

Fourth, social security system does not cover the cost of wearables. There are no standards for the evaluation of the effectiveness of wearable devices for chronic disease on a population level. It is difficult for patients to get refunded from the public insurance system.

Fifth, consumers often find it untrustworthy to share bio-metrics data. Whether it is with doctors or with insurance providers, or family and friends, users are not willing to share their data. Most people, however, don't know how their data collected on wearables are stored, shared, and used; data can flow to Facebook, Apple, Google, Baidu, and Amazon without users noticing it, let alone giving consent. This leads to the monopoly of tech companies in data storage and processing. These companies already have the most robust computing power, storage units and the best algorithms.

Lastly, there is no clear legal definition on the ownership of personal data. Users may find they have lost the rights to their data to data controllers easily. Given the wide industrial approach of uploading data and processing on the cloud, it is almost impossible to track the flow of data once it left the device.

4. POLICY IMPLICATIONS

To fully implement IoT solutions in healthcare industry, healthcare service providers need to work with government to build up data sharing platforms, eliminating duplicated procedures and facilitating access to medical records. Medical devices regulators shall adapt the technology standards along with technology development.

Local authorities shall be given more authority to test the healthcare programs based on their own pri-

ority and get involved with the retired population which may return to workforce. Employers may find the elderly to be more patient, careful, trained and trustworthy than imagined. In this way, healthcare quality variation can be adjusted, and optimal pathway can be promoted. When it comes to new drugs and new technology approval, population health assessment based on big data will make it possible for more policy makers to say yes or no to new drugs and treatment methodologies with much more efficiency.

Rising healthcare costs associated with the aging population has led to concerns that the retired and the old may cause great stress for the welfare system⁸. Wearable devices may make it possible to monitor the health conditions for the elderly and allow them to live independently as long as possible. By interacting with technology and initiating data sharing, life quality of the elderly may also improve. There are barriers on data interoperability, technology standards, privacy and safety concerns involved for the medical use of IoT devices. Policy makers may need to follow up more closely with technological development to adapt the technology usage standards and improve public awareness about data storage, usage, and sharing involved in wearable technology and AI for medical use. A clear definition about data ownership would also help to determine the ethical and legal methods of personal bio-metrical data collection in the coming era of Internet of Healthcare Things.

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7 Same with Fitbit

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