

Health Policy in East Asia: Responding to Demographic and Epidemiologic Transition

Karen Eggleston

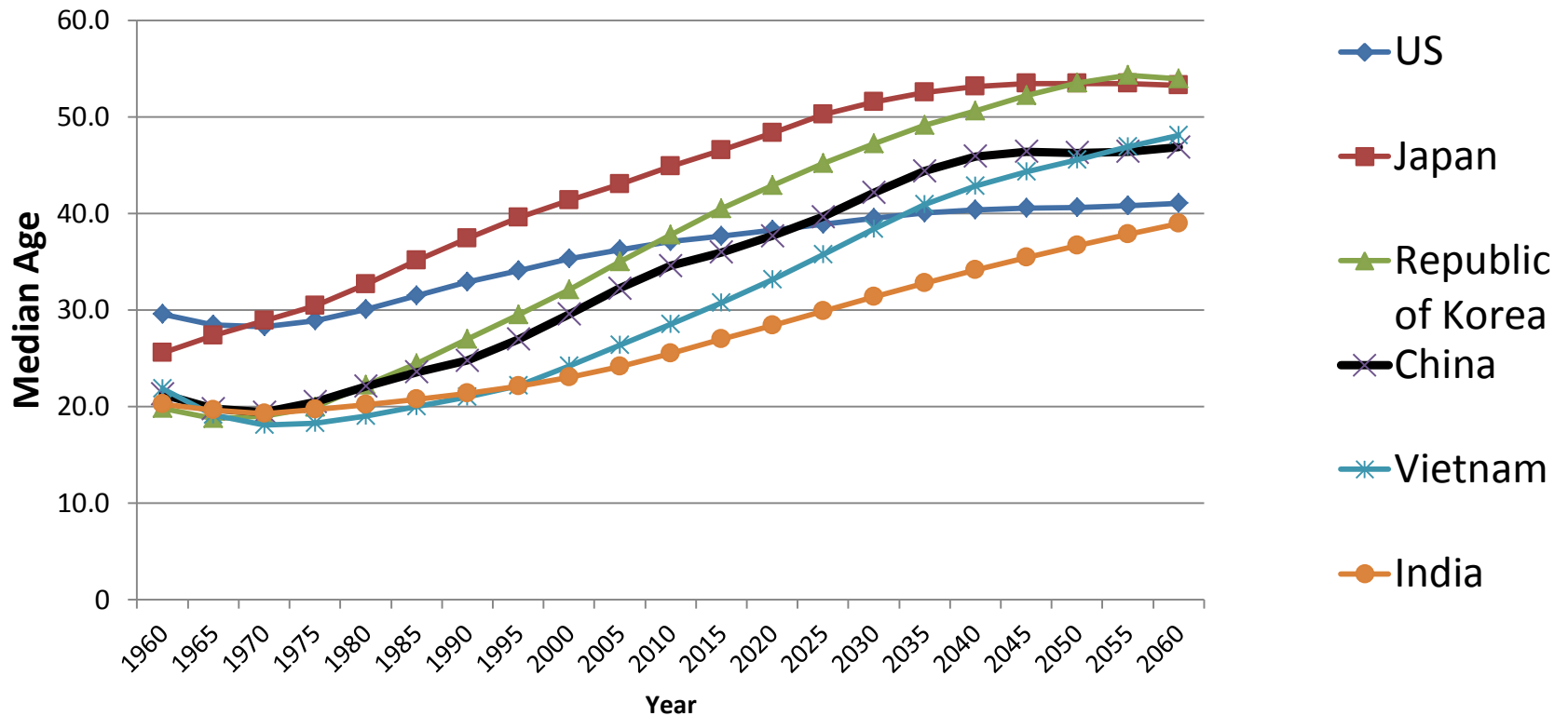
Stanford University and NBER

S T LEE LECTURE

University of Sydney

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Median Age in Asia in Comparative Perspective, 1960-2060



Source: United Nations, *World Population Prospects: The 2012 Revision*. Medium Variant.

Outline

- Health systems of East Asian countries, like many others across the globe, must confront challenges associated with demographic and epidemiologic transition.
 - With populations enjoying longer, healthier lives, societies are rapidly aging and adjusting to large burdens of chronic non-communicable disease.
 - Social case for strengthening healthcare financing, especially for vulnerable elderly in poorer areas
- Need for shift to integrated/ coordinated primary care and “value for money”
 - Importance of payment incentives
 - Prescribing and dispensing tradition
 - Measuring and rewarding value: Illustrative study for diabetes in Japan



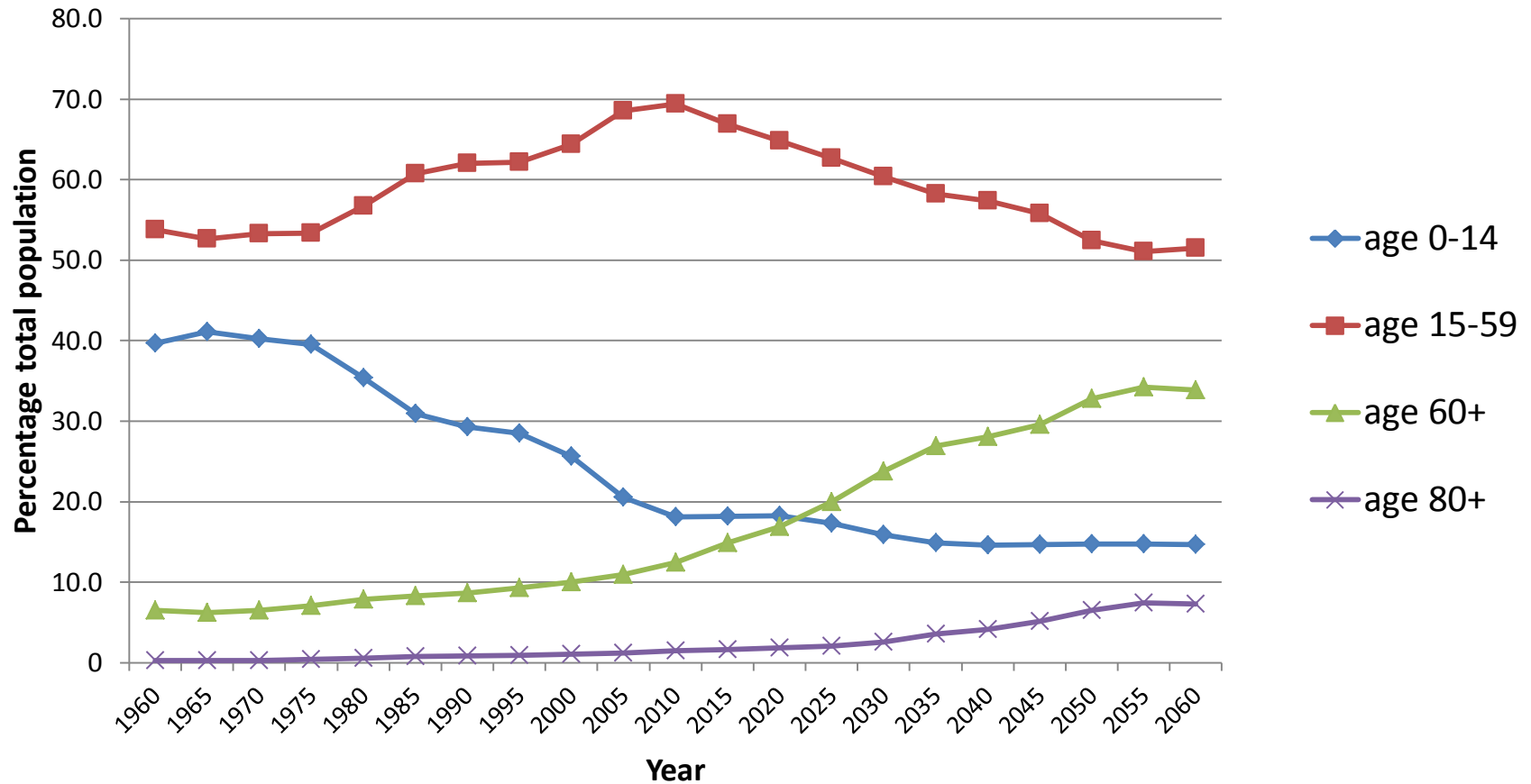
China's dramatic change

- Early Mao era: half a billion, 36% age less than 15, 80% rural, one-third illiterate, and living in absolute poverty.
- By 2010: 1.3397 billion; ageing (13.3% over age 60 and only 16.6% below age 15); half (49.7%) urban; 96% literate, with 23% attaining a high school or college education.
- Middle income, 3 decades of unprecedented economic growth.

Three Intertwined Transitions

- Demographic transition
 - Soon, China's 65+ pop > total current US pop
- Epidemiologic/health/nutrition transition
 - From infectious to non-communicable chronic disease
 - Urbanization, sedentary lifestyles
- Economic system transition (central planning to market-based economy) and/or economic development (e.g. agricultural rural economy to manufacturing- and service-based urban economy)

Structure of the PRC Population, 1960-2060



Source: United Nations, *World Population Prospects: The 2012 Revision*. Medium Variant.

The Economic Implications of Population Ageing in China and India:

Introduction to the Special Issue

The Journal of the Economics of Ageing

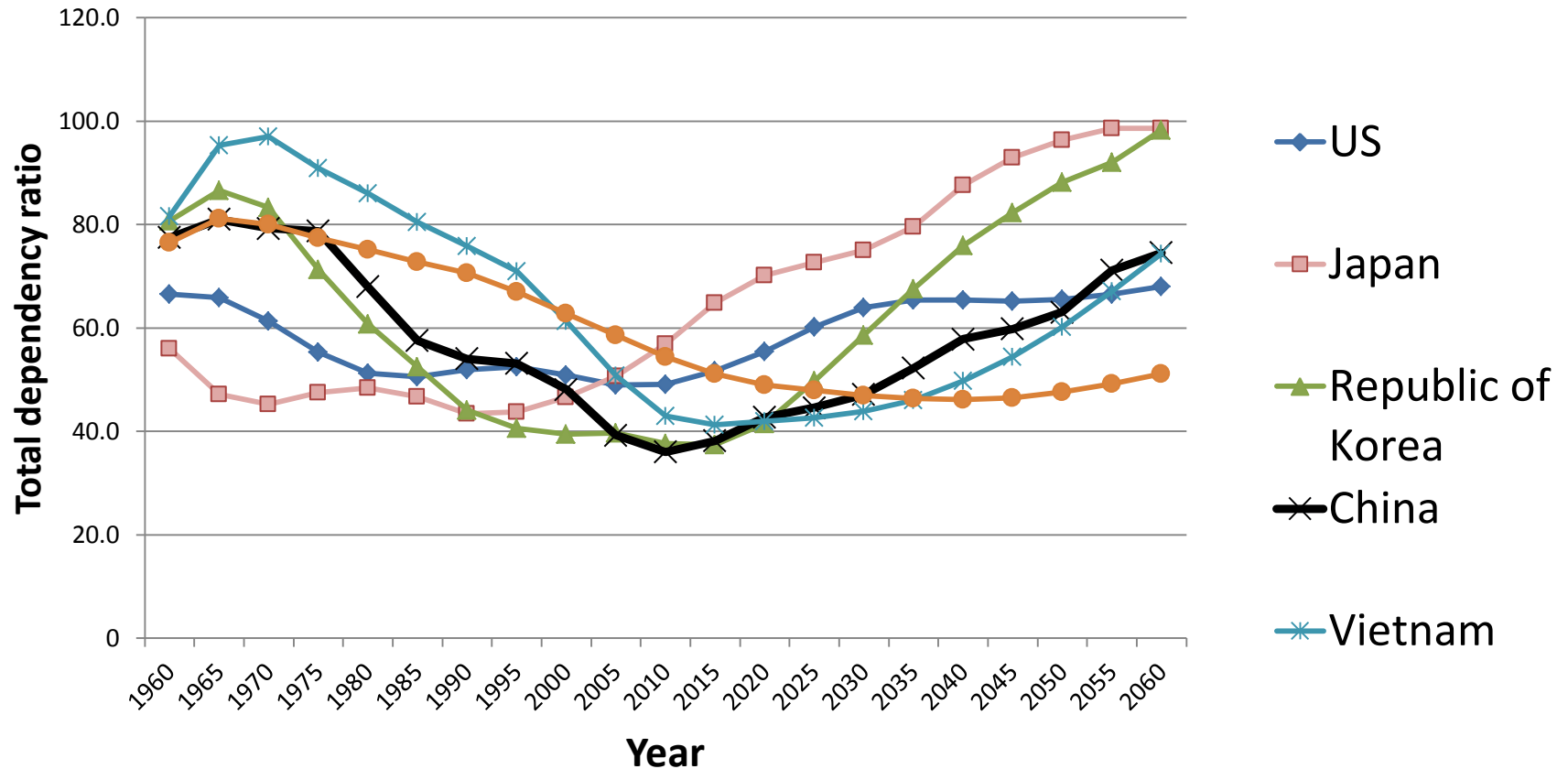
By

David E. Bloom and Karen N. Eggleston

Demographic Transition and Economic Growth

- “Demographic dividend” – a one-time boost in GDP per capita – when the working-age share of the population is relatively high, if that population is productively employed (Bloom et al.)
 - Estimated to account for 15% to 26% of China’s rapid growth since 1970s (Wang and Mason; Bloom et al.; Cai Fang; Aoki)
- Increased nutrition, education, and skills per child can enable sustained economic growth
- Spurs productivity in combination with
 - urbanization
 - industrialization
 - “catch-up” in technology

Total Dependency Ratios in Asia in Comparative Perspective, 1960-2060



Source: United Nations, *World Population Prospects: The 2012 Revision*. Medium Variant.

The New Demographic Transition: Most Gains in Life Expectancy Now Realized Late in Life

Karen Eggleston and Victor Fuchs

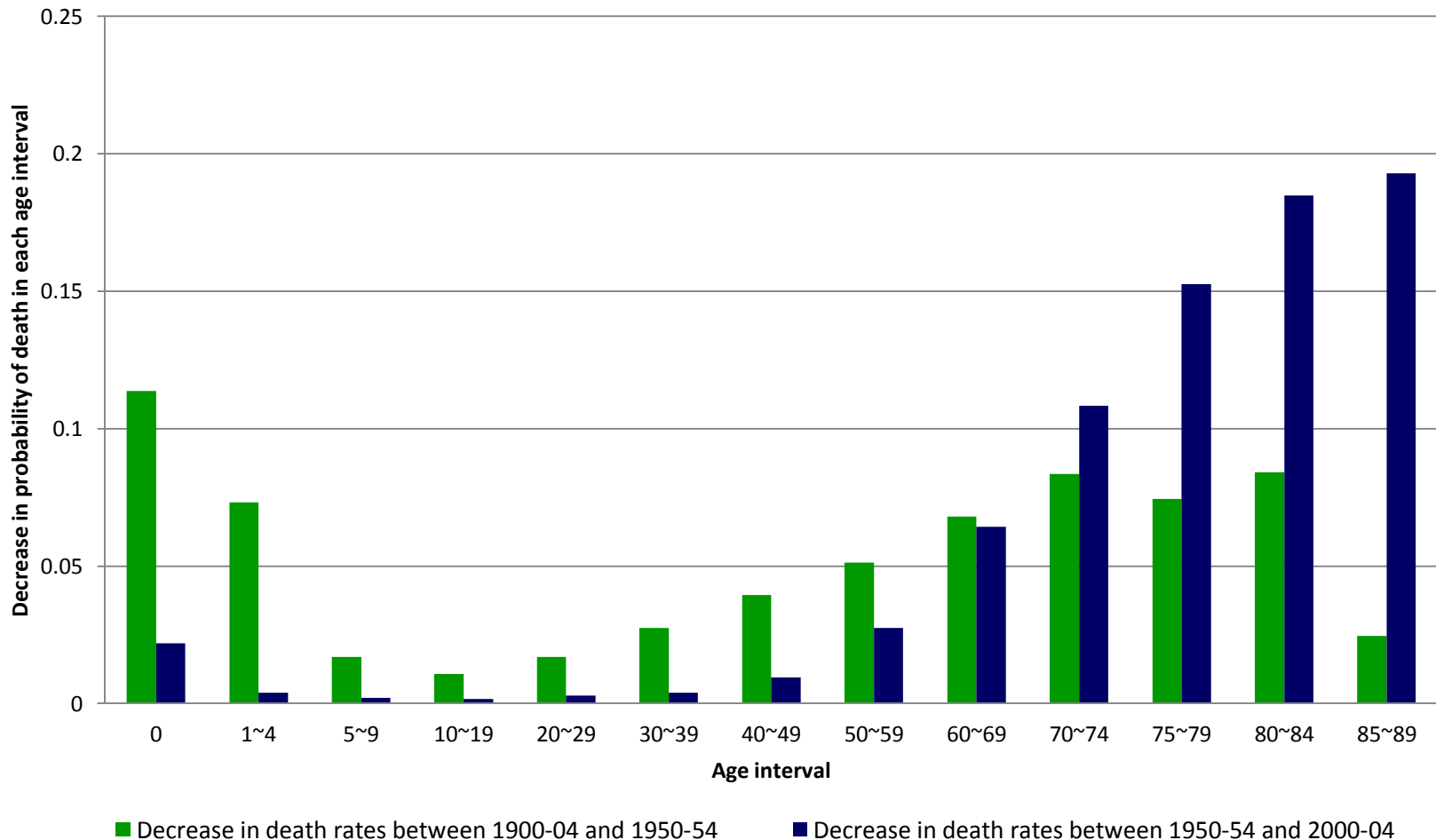
Journal of Economic Perspectives

2012 26(3): 137-56.

- The share of increases in life expectancy realized after age 65 was only about 20 percent at the beginning of the 20th century for the United States and 16 other countries at comparable stages of development;
- but that share was close to 80 percent by the dawn of the 21st century, and is almost certainly approaching 100 percent asymptotically.

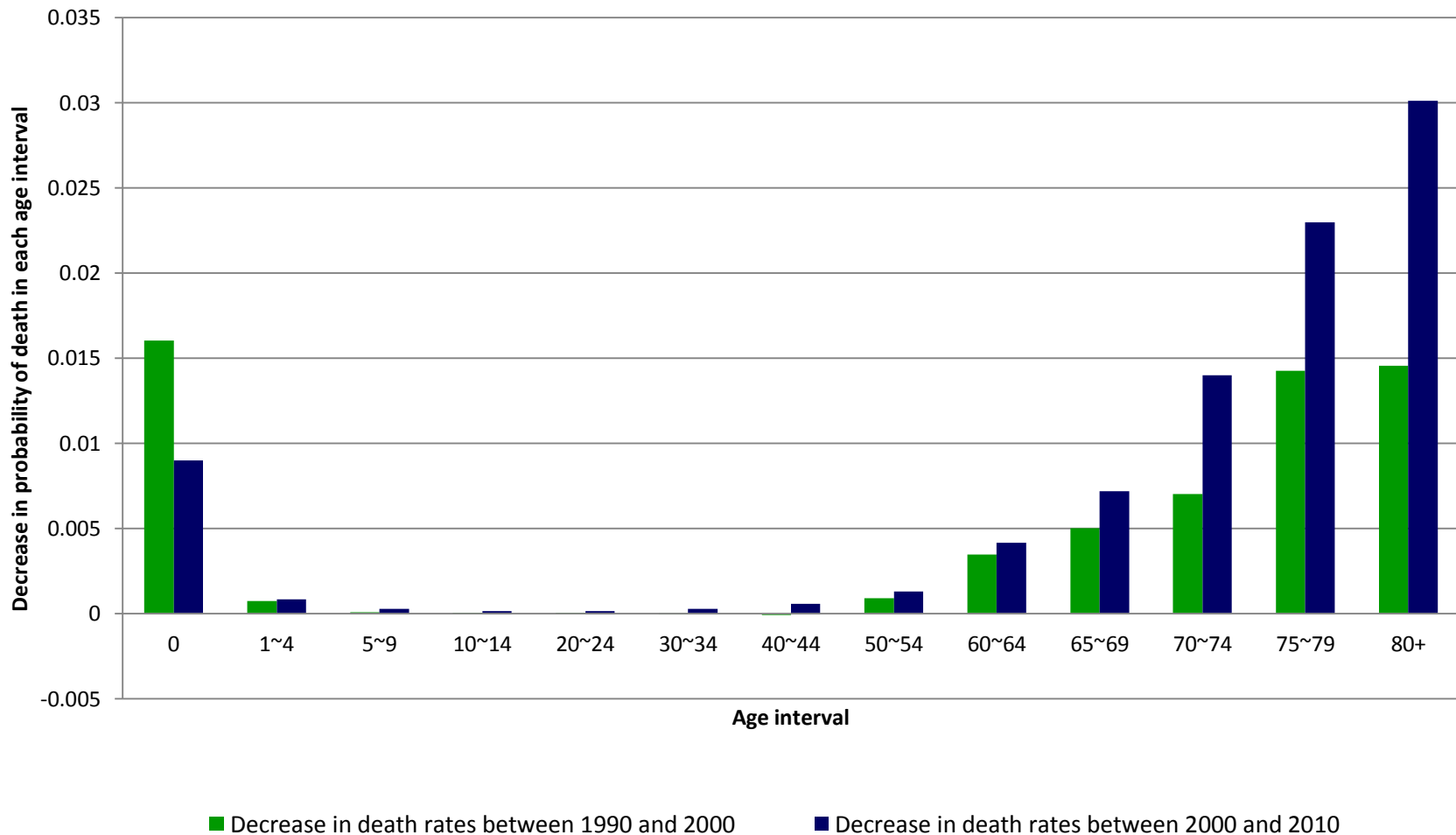
In Europe, over a century...

Decrease in Death Rates by Age Group in England and Wales, 1900-04 to 1950-54 and 1950-54 to 2000-04



In China, just a few decades...

Decrease in Male Death Rates by Age Group in China, 1990-2000 and 2000-10



- Demographic and epidemiologic change also shape work-lives and thus financing of social protection programs, with many Asians spending a declining share of life expectancy in the labor force—raising questions about sustainable financing for health insurance and long-term care

The “Longevity Transition” in Asia and Select Developing Countries

Country (Years)	Change in years lived past 65 as a percentage of change in life expectancy at birth, 1990-2010	Male XLFP/LE, 2007 (Illustrative)
Japan	Males 72.7%, Females 87.0%	54.1%
South Korea	Males 45.4%, Females 57.1%	52.0%
China	Males 51.9%, Females 40.6%	57.6%
Philippines	Males 26.2%, Females 36.0%	59.6%
Indonesia	Males 26.1%, Females 35.7%	64.5%
Brazil	Males 34.2%, Females 35.0%	59.1%
Vietnam	Males 32.5%, Females 34.7%	54.6%
India	Males 23.6%, Females 25.8%	60.0%
Bangladesh	Males 20.7%, Females 25.4%	60.9%

Based on recent life tables acquired from the US Census Bureau Eggleston Fuchs 2012

Will the new demographic transition inevitably lead to slower economic growth and crises of sustainability (e.g. Europe, Japan)?

- Enlightened people, foreseeing longer lives, might choose to **work longer, save more, and/or invest in human capital in sufficient amounts and innovative enough ways** that longer lives contribute to increased prosperity.
- Will East Asia choose to do so?



Elderly Health and Long-Term Care Needs:

Recent Evidence from CHARLS baseline

(China Health and Retirement Longitudinal Study 2011)

- Among 60+, 31.8% report poor health;
- 38.1% report a disability;
- 23.8% report requiring assistance with basic daily activities;
- 33.4% experience bodily pain.
- 10.7% underweight; 28.0% overweight, of which 4.5% were obese; and
- 54.0% had hypertension (30-40% undiagnosed, higher in rural areas).
- **Women in worse health (although live longer).**

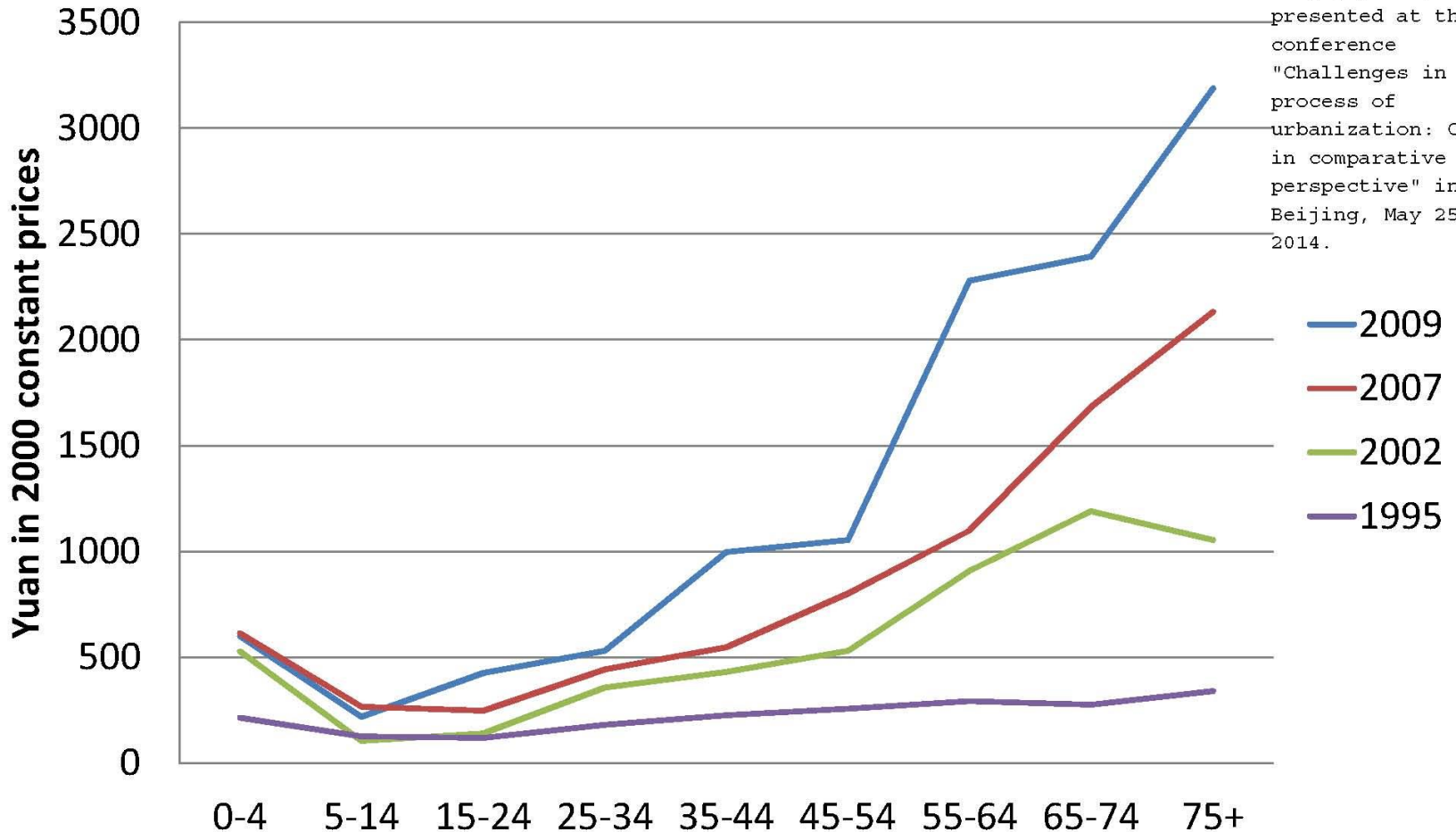
Chronic Disease Burden

- In “The Macroeconomic Impact of Non-communicable Diseases in China and India: Estimates, Projections, and Comparisons,” Bloom et al. (Journal of the Economics of Aging 2014) study the impact of five non-communicable diseases (NCDs) on the projected economic performance of China and India from 2012-2030
 - China projected to incur a financial burden approximately five times greater than India.
 - In aggregate, the financial expenditure for the measured NCDs over the 19-year timeframe is US\$23.02 trillion for China.



Per Capita Health Expenditure in 2000 constant prices

Chen Qiulin, 2014. "Economic Impact of Demographic Change in China and India" by Qiulin Chen and Sanghyop Lee, presented at the conference "Challenges in the process of urbanization: China in comparative perspective" in Beijing, May 25, 2014.

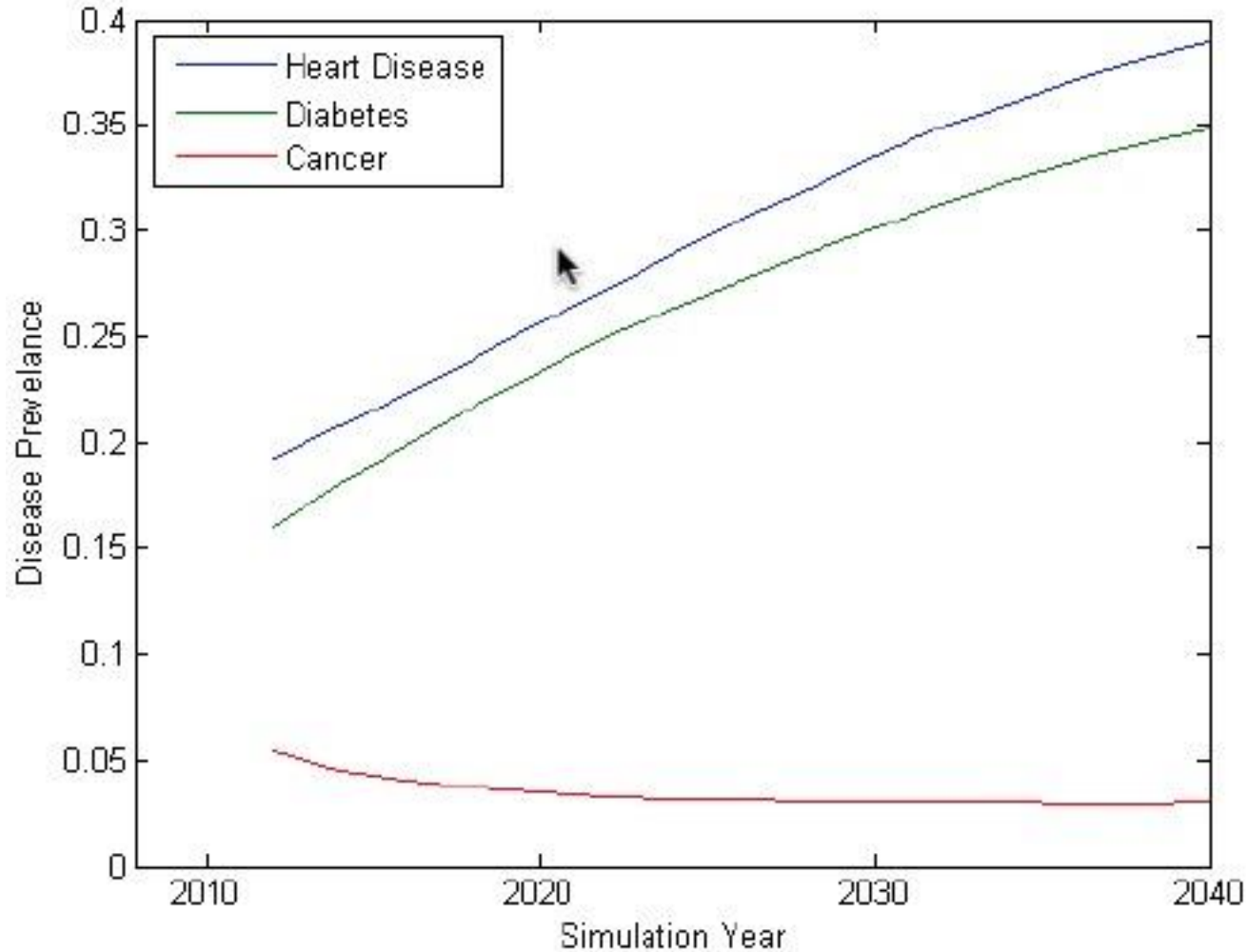


Sources: 1995, 2002 and 2007 profiles were estimated from China Household Income Project Survey (CHIPs 1995, 2002 and 2007). 2009 profiles was estimated from Chinese Family Panel Studies, CFPS 2010.

Based on calculations by the authors for the National Transfer Account estimates for China.



Simulating Future Disease Prevalence with “Future Elderly Model” for Japan

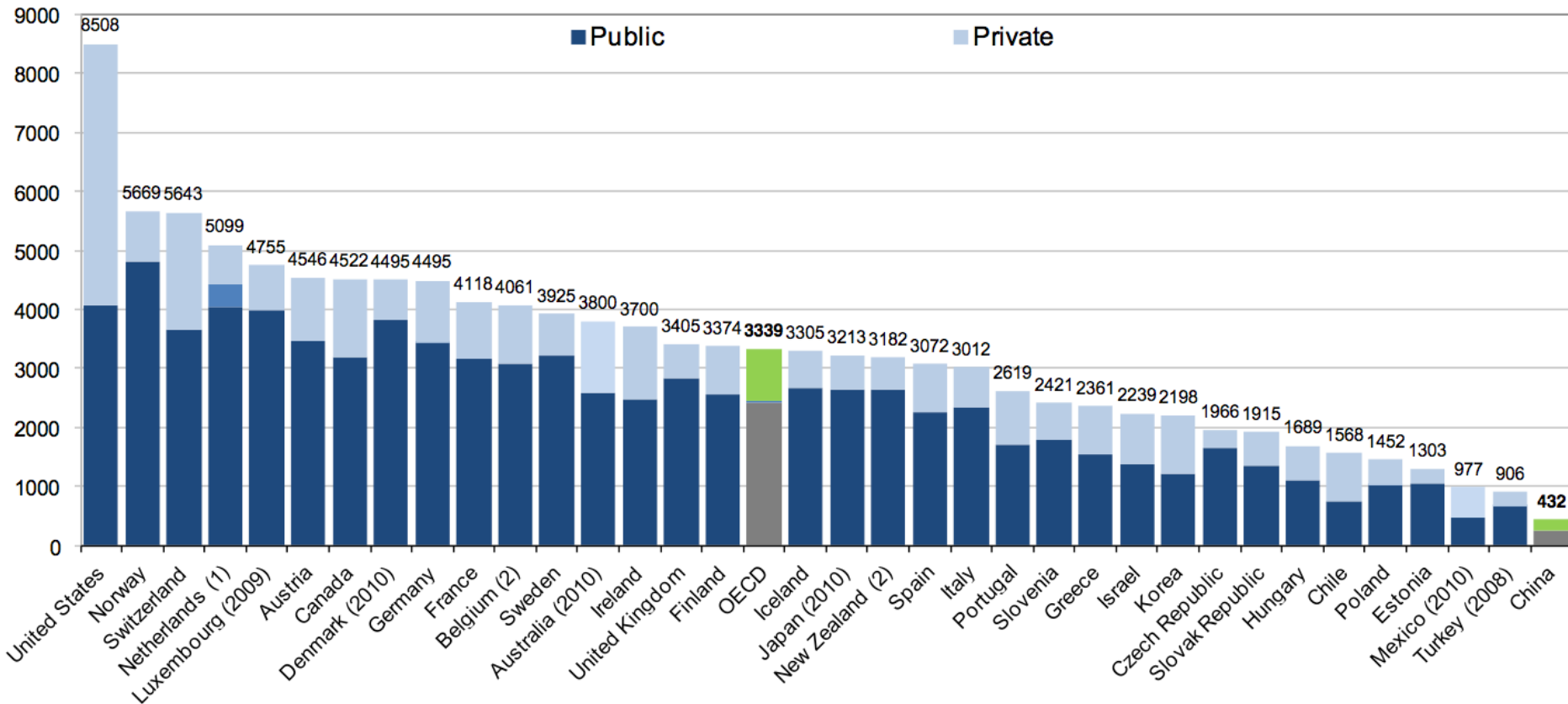


Brian Chen, Hawre Jalal, Karen Eggleston, Michael Hurley, Lena Schoemaker, and Jay Bhattacharya, November 2014 Stanford working paper

Health Spending Per Capita, 2011, OECD

Health expenditure per capita, public and private expenditure, OECD countries, 2011

US\$ PPP per capita



1. In the Netherlands, it is not possible to distinguish clearly the public and private share for the part of health expenditures related to capital expenditure.
 2. Total expenditure excluding capital expenditure. Source: OECD Health Data 2013, June 2013.

OECD Health Data 2013, How Does China Compare with OECD Countries

- + To adapt to this new reality, substantial policy priority should be placed on strengthening primary care and enhancing value-for-money in the health sector.

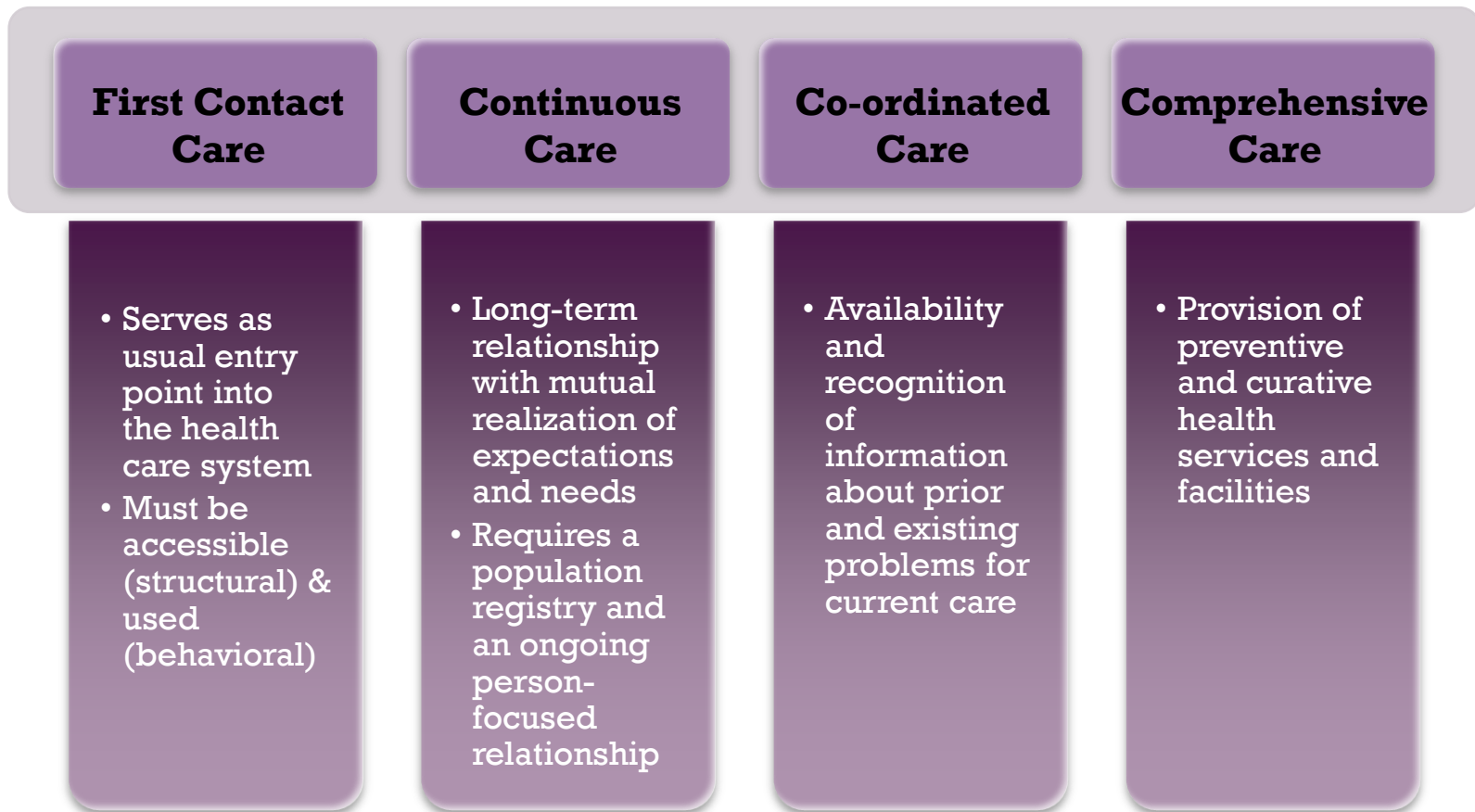
+ The quality of primary care providers in China is highly heterogeneous.

- Earning patients' trust
 - Training and ongoing clinical updating
 - Work effectively with hospitals ('two-way referral system')
- Importance of payment incentives and contracting to meet these goals





Four core domains of primary care, each with two subdomains: a structure-related subdomain (capacity to provide needed services) and a behavior-related subdomain (service is provided when needed)



+ Case Study: Shandong, China

Aim and Data

To study the effectiveness of contracting for primary care with community health centers, including private providers

- Data sources: One, administrative records at the municipal and provincial levels; two, a household survey of 1013 community residents in Weifang and 681 residents in City Y; and three, a provider survey of 1298 staff at official community health stations (CHS) in Weifang and City Y
- Patients' scores based on a locally contextualized PCAT, anonymous questionnaires to staff members in CHS, and one-on-one, in-depth interviews for qualitative data
- Conducted in November 2009

+ Case Study: Shandong, China

Results and Conclusions

- **Residents do not trust community health stations** generally and tend to do a routine health exam there only if they were of low socioeconomic status
- **Improved provider payment methods should be considered**
 - to minimize the unintended consequences under fee-for-service for services not explicitly rewarded in the performance contract and
 - reverse the **over-focus on curative care and relative neglect** towards preventive health services and population health outreach services

Limited Evidence on Provider Payment Reforms away from FFS in Asia

- Like non-Asian OECD countries, most Asian countries have been seeking methods to constrain rapid health expenditure growth while improving quality and access
 - Demand-side cost sharing (yet well known drawbacks: barrier to access for the poor)
 - Supply-side cost sharing
 - Case-based payments, e.g. DRG for hospitals
 - Capitation (e.g. Thailand achieving universal coverage)
 - Global budgets (e.g. Taiwan)
 - Some experiments with P4P, little measure of “value”
 - Tsai. et al. (2010) "P4P on TB" program improved the treatment default rate for TB patients in Taiwan, 2002 to 2005.

Tsai, W. C., P. T. Kung, M. Khan, C. Campbell, W. T. Yang, T. F. Lee, and Y. H. Li. 2010. "Effects of Pay-for-Performance System on Tuberculosis Default Cases Control and Treatment in Taiwan" *The Journal of Infection*, 61(3): 235-243.

Physician-dispensing in Asia

- Traditionally, physician payment was for drugs:
- “It was considered morally unacceptable to accept fees for performing a humane service” [diagnosis] (Ikegami 2005, p.124)



Evidence of profit-related prescribing in China

- Currie, Lin, and Zhang (2010 JHE) audit the antibiotic prescribing behavior of hospital-based physicians in two cities and one rural area using student "simulated patients" during the 2008 and 2009 flu seasons.
- They find that Chinese physicians prescribe antibiotics for a startlingly high proportion of patients (averaging 62%), even when patients report symptoms that do not warrant antibiotics;
- 39% of physicians still prescribed antibiotics when the simulated patients signaled to doctors that they knew that taking antibiotics would be inappropriate.
- In follow-on study, found the over-prescription greatly reduced when profit incentive removed (because "patient" said would buy the drug elsewhere)

Preliminary results



Managing chronic disease in rural China: Will lowering drug copayments enhance adherence and improve outcomes?

Karen Eggleston, Stanford University and NBER
Wang Yan, Shandong Department of Health
Jinan Zhang, Stanford University

+ Research questions



- We study a county in Shandong Province that began in July 2010 distributing free antihypertensive medications to all residents over age 60 with diagnosed hypertension.
- Utilizing unique patient-level clinical and spending data from this natural experiment in rural China, we study the impact of lowering patient co-payments for anti-hypertensives on total and out-of-pocket medical spending, as well as self-reported health and medication adherence.



The poorest elderly patients benefit



- For the poorest-income quartile patients with hypertension, reduction in spending
 - medication spending
 - overall spending
 - out-of-pocket burden for the most vulnerable patients
- Self-reported blood pressure, self-assessed health, and general well-being do not differ significantly from comparison group
 - May be too early to see any effect, or self reports are not accurate or sensitive enough to detect
 - If lower spending leads to better adherence, have reason to expect improved blood pressure control in future for this vulnerable population (elderly poor in rural areas)

The net value of health screening and incentives for management of diabetes and hypertension in Japan, 2008-2012

Karen Eggleston and Toshiaki Iizuka

Stanford University and University of Tokyo

***Preliminary* results, as presented at ECHS conference in Dublin, July 2014**

+ Background



■ Japan is emblematic of the age of longevity

- Highest proportion of elderly adults in the world
- Low fertility and increased longevity → population declining (projected to decline to 87 million by 2060)
- 40% of population over 65 by 2060

■ Policymakers searching for strategies

- Enhance healthcare productivity and improve “value for money” in chronic disease management
- Improve health through prevention (e.g. mandatory annual health check-ups) to help compress morbidity and delay onset of chronic disease

- For this presentation, focus on the results regarding diabetes

+ Research questions

- Has the net value of treatment for diabetes increased in Japan?
 - Is increased spending associated with commensurate improvements in quality?
 - Is healthcare productivity increasing?
 - Is healthcare inflation over-estimated because it is not adjusted for quality improvements?
- Do individuals respond to the signals embodied in regular health screening such as Japan's annual mandatory health screening program, and do responses increase net value?
 - Is there a causal link between increased input use and improved outcomes?
 - Regression discontinuity analyses, using clinical thresholds of diagnosis to approximate random assignment



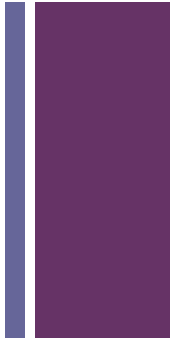
Previous literature on net value



- Research dating back to the pioneering work of Scitovsky (1965) measures the value of health care **spending** not with inputs but with the desired output: cure or management of a specific medical condition
- Most studies focus on acute conditions
 - Cutler, McClellan, Newhouse and Remler (1998): estimate that a quality-adjusted price index for **heart attack treatments** declined about 1 percent annually between 1983 and 1994.
 - Berndt, Bir, Busch, Frank, and Normand (2002) similarly find that the incremental cost of treating an episode of **acute phase major depression** fell between 1991 and 1996.
 - Focusing on **cataract surgery** between 1969 and 1993, Shapiro, Shapiro, and Wilcox (2001) find that spending has not increased faster than the general price level.



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+ Net value of chronic care

- Constant et al. (2006): quality-adjusted price index for **cancer** treatment declined by 5.4% annually between 1995 and 2003.
- Examining **colorectal cancer** drugs, Lucarelli and Nicholson (2009) estimate that two quality-adjusted price indices were roughly constant between 1993 and 2005.
- Eggleston et al. (2009): benefits of the additional or newer care for **diabetes in the US** outweighed the greater costs for the average patient between 1997 and 2005.
- No similar studies yet in Asia (requires detailed data on clinical metrics such as blood pressure and HbA1c to value quality change, as well as total spending)

+ Data



- 13,322 employees with Diabetes (DM) from JMDC database
- Total annual medical spending (from medical claims including drugs), matched with detailed clinical data from ICD10 codes and annual mandatory health check-ups
- Five-year period 2008-2012



Net value: $\Delta V - \Delta C$



- Comparing health care in 2008-09 with that of 2011-12
- ΔV = monetary value of
 - improvements in health status (lower mortality risk)
 - and, in some specifications, avoided treatment spending from lower probability of AMI and stroke
- ΔC = increase in annual inflation-adjusted treatment spending
 - Total medical spending, based on actual claims
 - 2010 ¥ using the CPI all-items index to convert monthly spending to real yen
- If $\Delta V - \Delta C > 0$, society is obtaining value for its money



Measuring outcomes: ΔV



- Cardiovascular risks (coronary heart disease, stroke) and non-cardiovascular mortality risk, using the JJ risk engine published equations (Tanaka et al., *Diabetes Care* 2013)
 - Age
 - Sex
 - HbA1c
 - BMI
 - Systolic blood pressure
 - Non-HDL cholesterol
 - Smoking status
 - Leisure time physical activity
 - for stroke, atrial fibrillation
- “Modifiable Risk” measures: hold age and duration of diabetes constant at their values at cohort entry.
- These “modifiable risk” measures reflect the risk factors amenable to change through clinical care.

+ Valuing health improvements



- Assume \$200,000 per life year
- Sensitivity analyses: \$50,000-\$300,000
- Three approaches
 1. By baseline age cohort
 2. Weighted average across age cohorts
 3. Individual patient level calculations

+ Preliminary results



- [Cannot post exact numbers before publication, but...]
- Spending increased
- Quality improved
- All estimates of net value were positive, albeit small

+ Conservative estimates



- (1) Ignore better quality of life and reduced probability of other adverse endpoints, such as blindness or amputation;
- (2) Mortality risk probably increasing over time rather than 20 percent of the predicted risk each of 5 years and zero thereafter (discounted at 3% for 20 years);
- (3) Spending = all medical spending (no attempt to isolate the fraction of spending directly attributable to diabetes).
- (4) Sample is employed population, with net value increasing by age, suggesting that including the net value for those in 70s and 80s (a large and growing population in Japan) would increase overall net value estimate.

+ Limitations

- Only includes the working-age population in Japan
- Only includes those with valid health check-up data in baseline and final periods (albeit bias mitigated because check-ups are mandatory)
- Not necessarily nationally representative
- JJ risk engine not yet widely validated, and does not predict fatal CHD and fatal stroke risk – we supplemented with estimates from our data
- Does not include value of work productivity (less absenteeism and “presenteeism” – future research topic)





Implications of net value estimates



- First study of net value of chronic disease management in Asia.
- Similar to the US, the unit cost of treatment for diabetes—adjusting for the value of health outcomes—has been roughly constant, if not decreasing, in Japan.
- Since input prices for health care have not been declining, our results are consistent with productivity improvement in health care.
- Remaining question: how much of the positive net value of increased spending is causal? Regression discontinuity analyses help to address...



Cost benefit analysis of DM treatment: the Regression Discontinuity (RD) approach

- Health checkup results (e.g., HbA1c, FBS) just below and above a threshold may be viewed as random
- Patients with just above the threshold value (e.g., $HbA1c \geq 6.5$) may receive more care (**inputs**) than those just below the threshold
 - We count the following inputs for the 12 months after a checkup
 - 1) DM-related physicians visits and hospital days, 2) HbA1c exam, 3) DM diagnosis, 4) use of DM drugs, and 5) DM-related medical expenditures
- Additional care may lead to better health **outcomes** for the patients just above the threshold
 - Lower HbA1c and FBS values the next year.
 - Lower cardiovascular risk and non-CVD mortality from JJ risk engine.
 - Lower CVD mortality risk as developed for the net value analyses (JJ risk engine + our estimates)
- By comparing the inputs & outcomes, we can compute the cost-benefit of providing DM care at the threshold.
- This approach is similar to Almond et al. (2010) “Estimating marginal returns to medical care: Evidence from at-risk newborns,” QJE

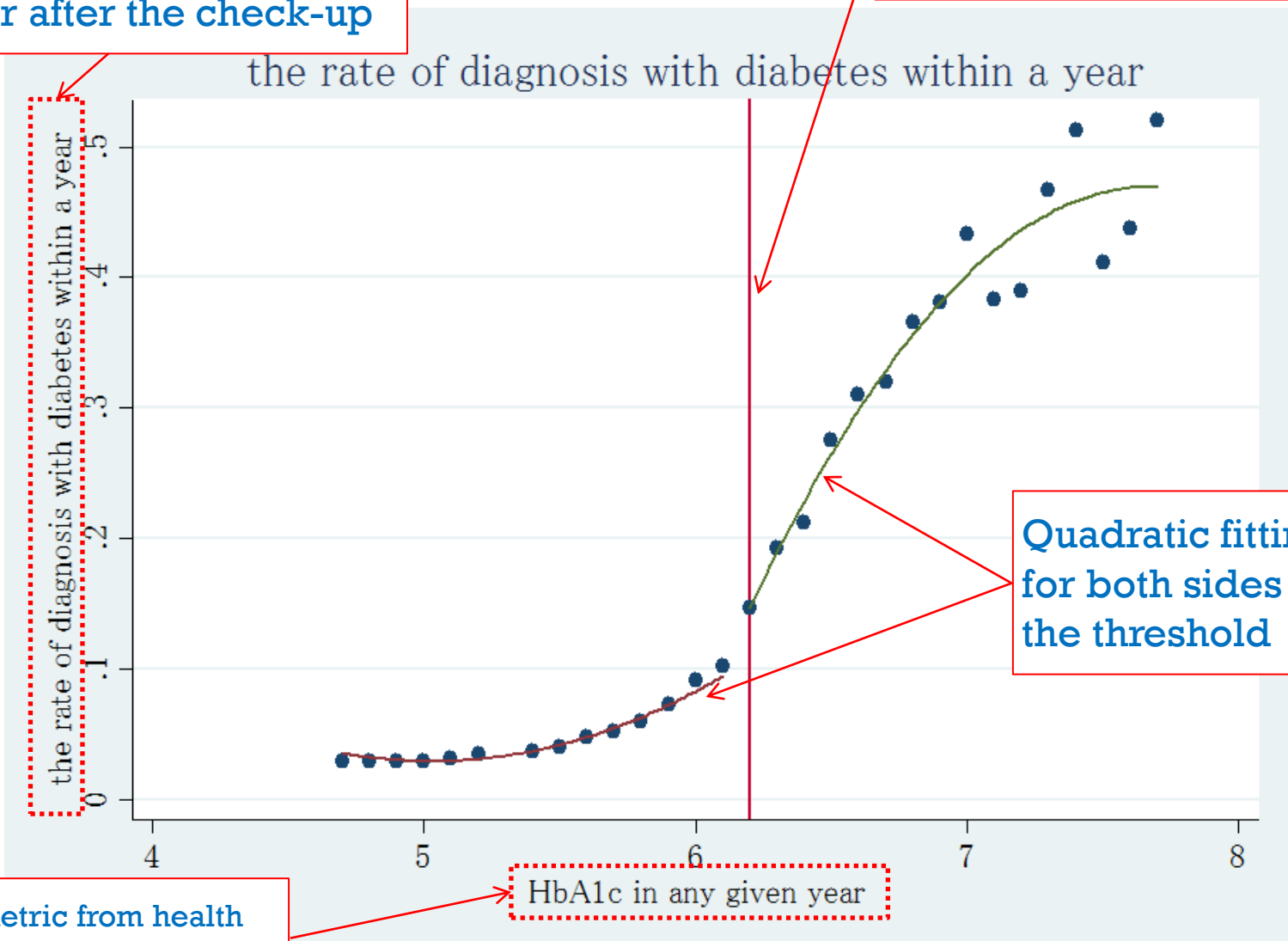
+ Data used in the RD analysis

- We include a checkup in the sample if it meets the following 6 conditions.
 1. A checkup was conducted between 2008 and 2011
 2. The patient had a checkup only once in a year
 3. Claims data of the patient exist for at least 6 months before the checkup.
 4. Claims data of the patient exist for at least 12 months after the checkup.
 5. The patient was not diagnosed as DM during the 6 months before the checkup (i.e., we focus on non-DM patients)
 6. The patient was 30~64 years old at the checkup.

Graphical presentation of RD design

Average (or rate) of outcome variable for each value group in the year after the check-up

Threshold line ex) HbA1c = 6.2



the rate of diagnosis with diabetes within a year

Quadratic fitting for both sides of the threshold

Health metric from health checkup, average by group

HbA1c in any given year

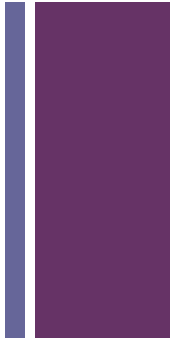
Results: Regression analysis (2-dimensions, HbA1c=6.3 or FBS=126)

- Crossing the threshold leads to:
 - A small, but statistically significant improvement in the intermediate outcome measures next year, in most of the specifications
 - Decrease in next year's FBS
 - Decrease in next year's HbA1c
 - Increase in the following input measures, especially when we use a wider window (with more observations)
 - # of DM-related office visits or hospital days
 - Probability of use of DM drugs
 - DM-related medical expenditures
 - No change in some other input measures, including
 - Probability of DM diagnosis
 - Probability of HbA1c exam
- Broadly similar results for HbA1c=6.2 & FBS=126



Results: Regression analysis of CVD risk outcomes

- RD analyses applied to the next year's CVD risks as measured by the JJ risk engine
- In some specifications where we use a large number of observations, the coefficient of the treatment variable becomes negative and significant (at the 5% level) for Stroke_risk.
 - As before, the treatment dummy is defined by the combination of HbA1c and FBS thresholds (using HbA1c=6.2 or 6.3 & FBS=126).
 - Point estimate for reduction in Stroke_risk is -0.009 ~ -0.01.
 - Implies a large reduction in risk relative to the sample mean of Stroke_risk, which is around 0.03~0.04. To be explored in further sensitivity analyses.
- RD results support causal interpretation of positive net value (improved outcomes not just associated with, but at least partially caused by, increased use of inputs)





Some conclusions



- Has the net value of treatment for diabetes increased in Japan?
 - Yes, consistent with improving productivity
 - Suggests caution in applying “blunt instruments” to limit spending growth – many treatments have positive net value
- Do individuals respond to the signals embodied in regular health screening such as Japan’s annual mandatory health screening program?
 - Somewhat – some indication that individuals may improve behavior and/or use more medical care to reduce subsequent risk of stroke and diabetes complications
- Much room for further improvement in productivity and in health behavior – not clear that making annual check-ups mandatory changed trajectory of health and spending.

+ Acknowledgement

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Thank you

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