Promoting Innovation in Jiangsu: Some Suggestions

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- The Comparative Advantages of Jiangsu
- Innovation and Investment in Intangible Capital
- Upgrading Jiangsu through Science and Technology
- Policy Recommendations
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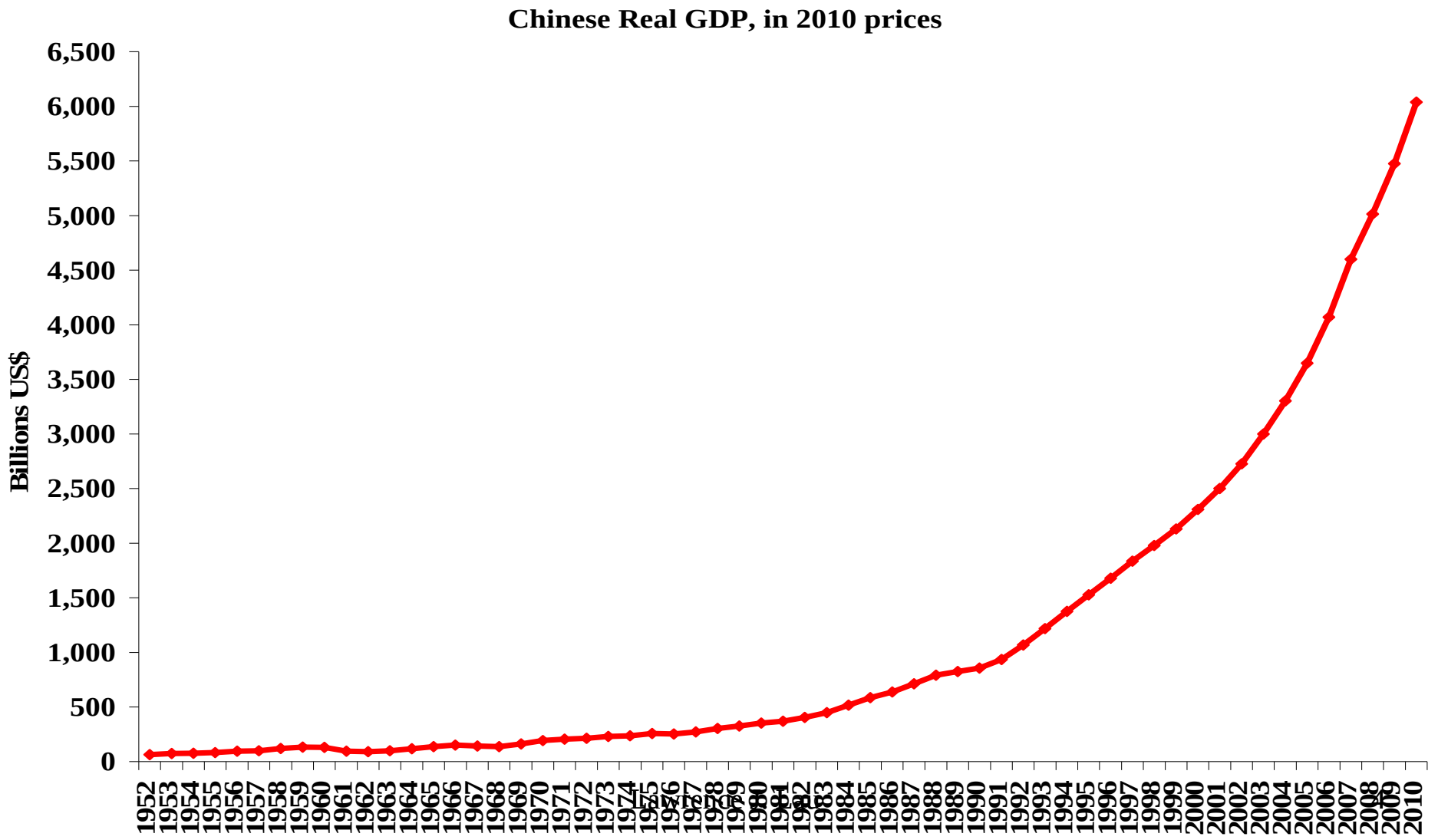
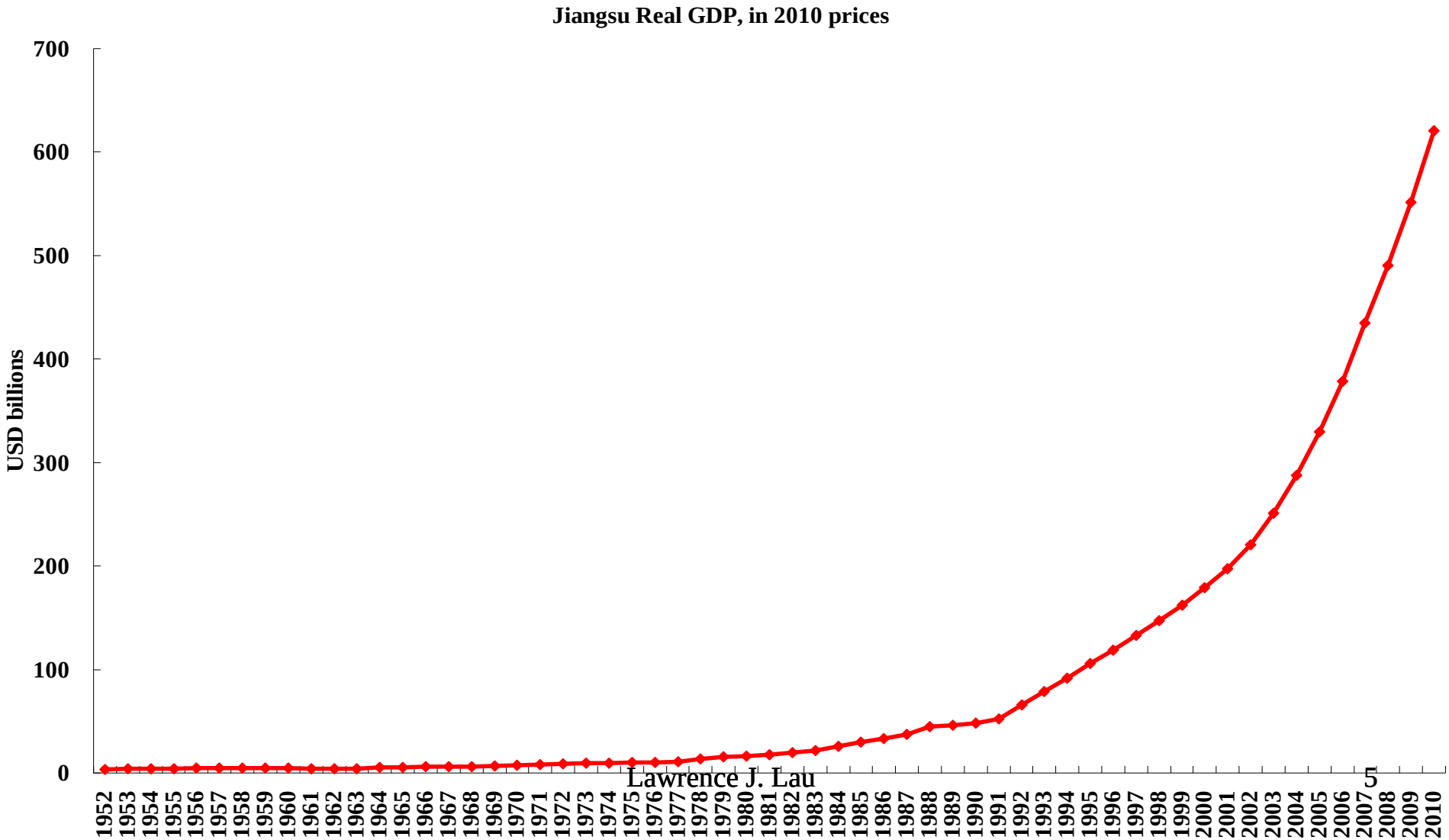
Introduction

- Between 1978 and 2010, Chinese annual real GDP grew more than 20 times, from US$304 billion to more than US$6.04 trillion (2010 prices) to become the second largest economy in the World, after the United States.
- Between 1978 and 2010, Jiangsu's annual real GDP grew more than 44 times, from US$14 billion to US$620 billion (2010 prices).
- Jiangsu's share of national GDP has increased from 5% in 1978 to more than 10% in 2010.

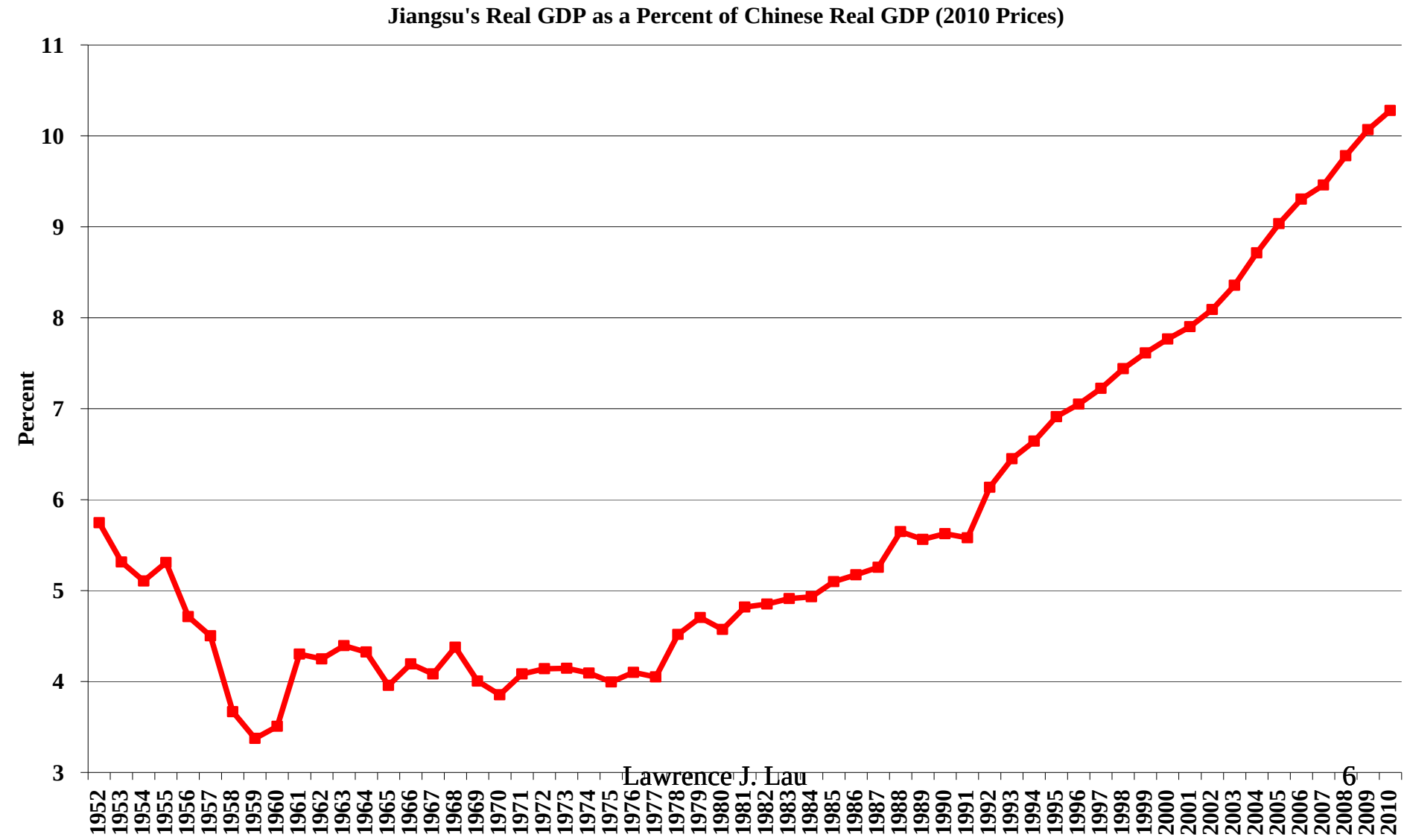
Chinese Real GDP in US$ Since 1952 (2010 Prices)



Jiangsu's Real GDP in US$ Since 1952 (2010 Prices)



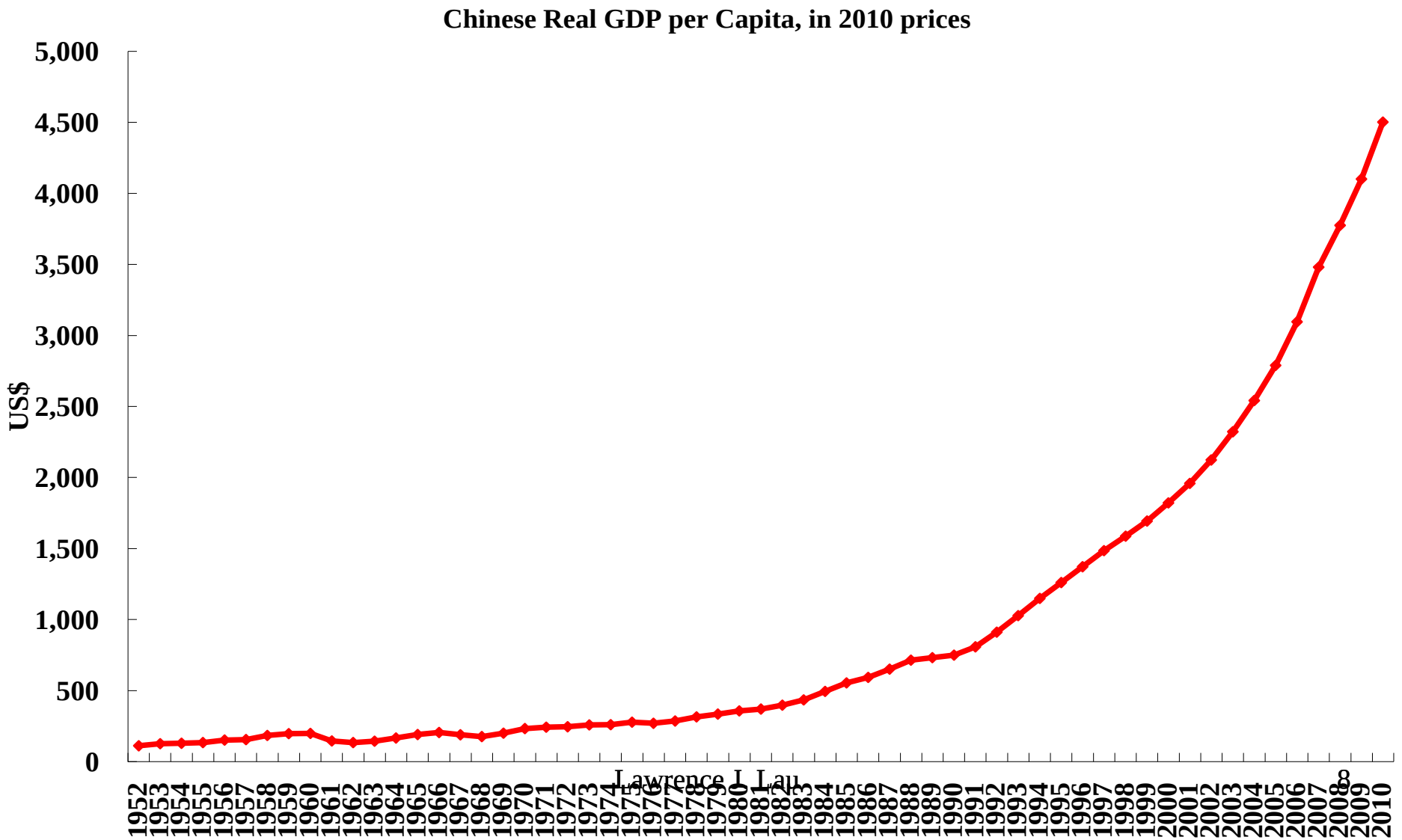
Jiangsu's Real GDP as a Percent of Chinese Real GDP (2010 Prices)



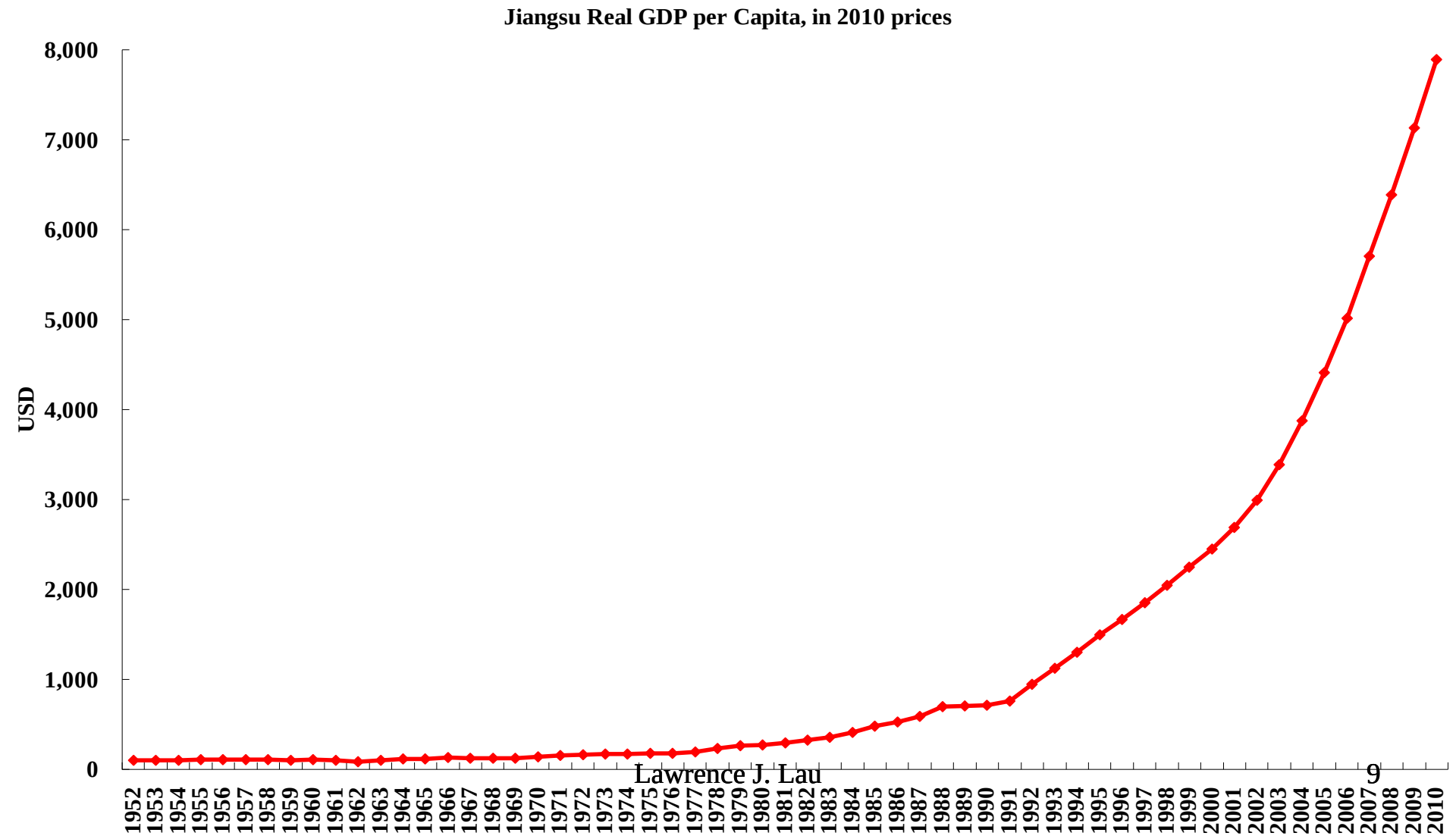
Introduction

- Despite the rapid economic growth of China (and Jiangsu), in terms of real GDP per capita, China and Jiangsu are still regarded as developing economies, or middle-income economies.
- Between 1978 and 2010, Chinese real GDP per capita grew almost 15 times, from US$316 to US$4,503 (in 2010 prices). By comparison, the Jiangsu GDP per capita grew almost 34 times, from US$235 to US$7,900 (in 2010 prices).
- Jiangsu has benefitted significantly more from the economic reform and opening than many parts of the country. It has also done significantly better than many parts of the country.

Real Chinese GDP per Capita in US$ Since 1952 (2010 Prices)



Jiangsu Real GDP per Capita in US$ Since 1952 (2010 Prices)



Introduction

- A principal theme of the Twelfth Five-Year Plan of the People's Republic of China is the transformation of the mode of Chinese economic development—firstly, from export-oriented to domestic demand-oriented and secondly, from input-driven to technical progress-driven or innovation-driven.
- The Twelfth Five-Year Plan of the Province of Jiangsu also reflects this theme. Jiangsu is right at the forefront of China, compared to the other provinces, municipalities and regions, in terms of the level of science and technology and innovative capacity. **Jiangsu has the potential of becoming the Province of Science and Technology in China.**

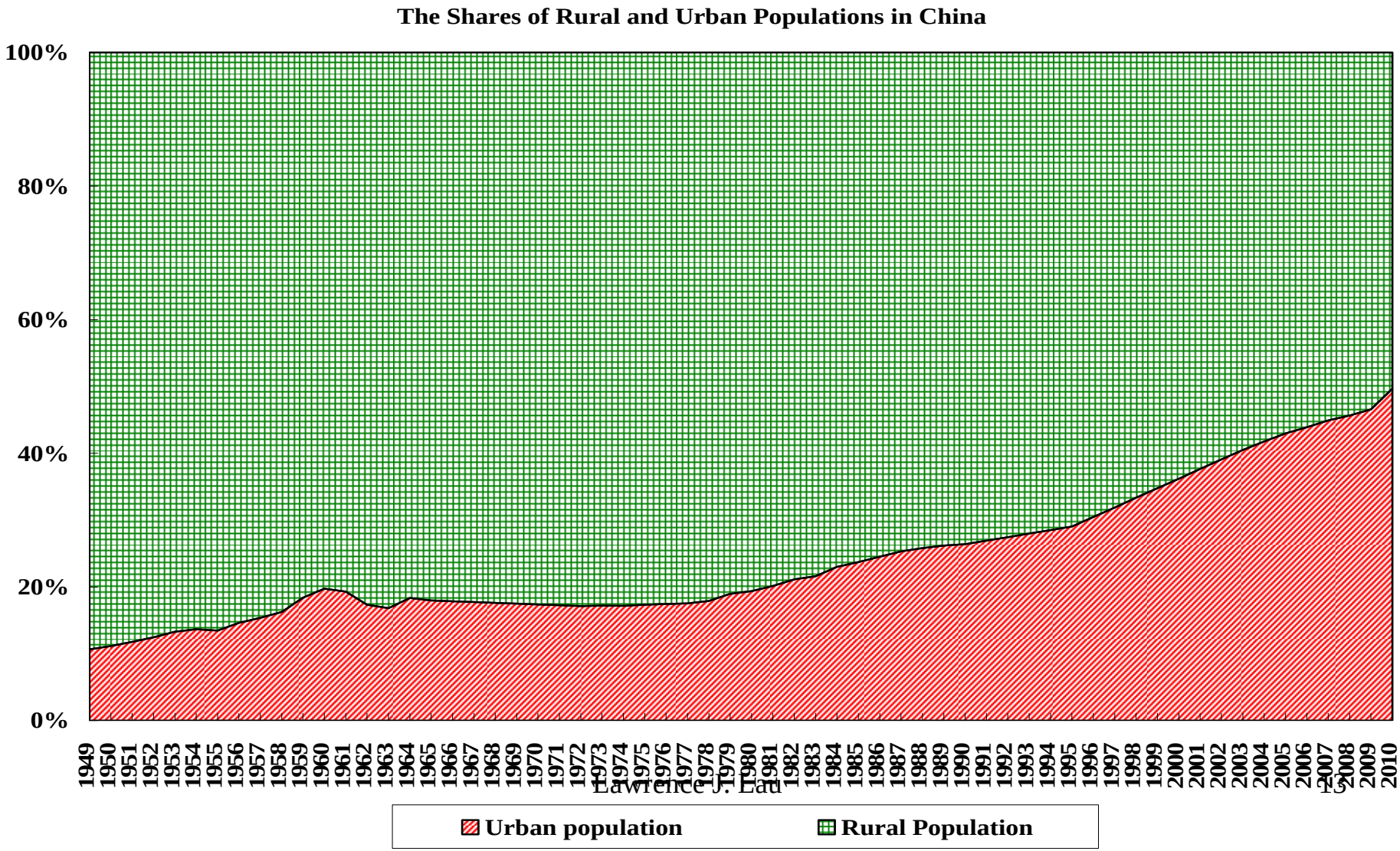
Introduction

- Long-term economic growth of a country or province depends on the rates of growth of its primary inputs—(tangible or physical) capital and labour—and on technical progress (or equivalently the growth of total factor productivity)—that is, the ability to increase output without increasing inputs.
- The rate of growth of tangible capital depends on the rate of investment on structure, equipment and basic infrastructure, which in turn depends on the availability of savings as well as the attractiveness of the investment environment.
- The rate of technical progress depends on investment in intangible capital (principally human capital and R&D capital).

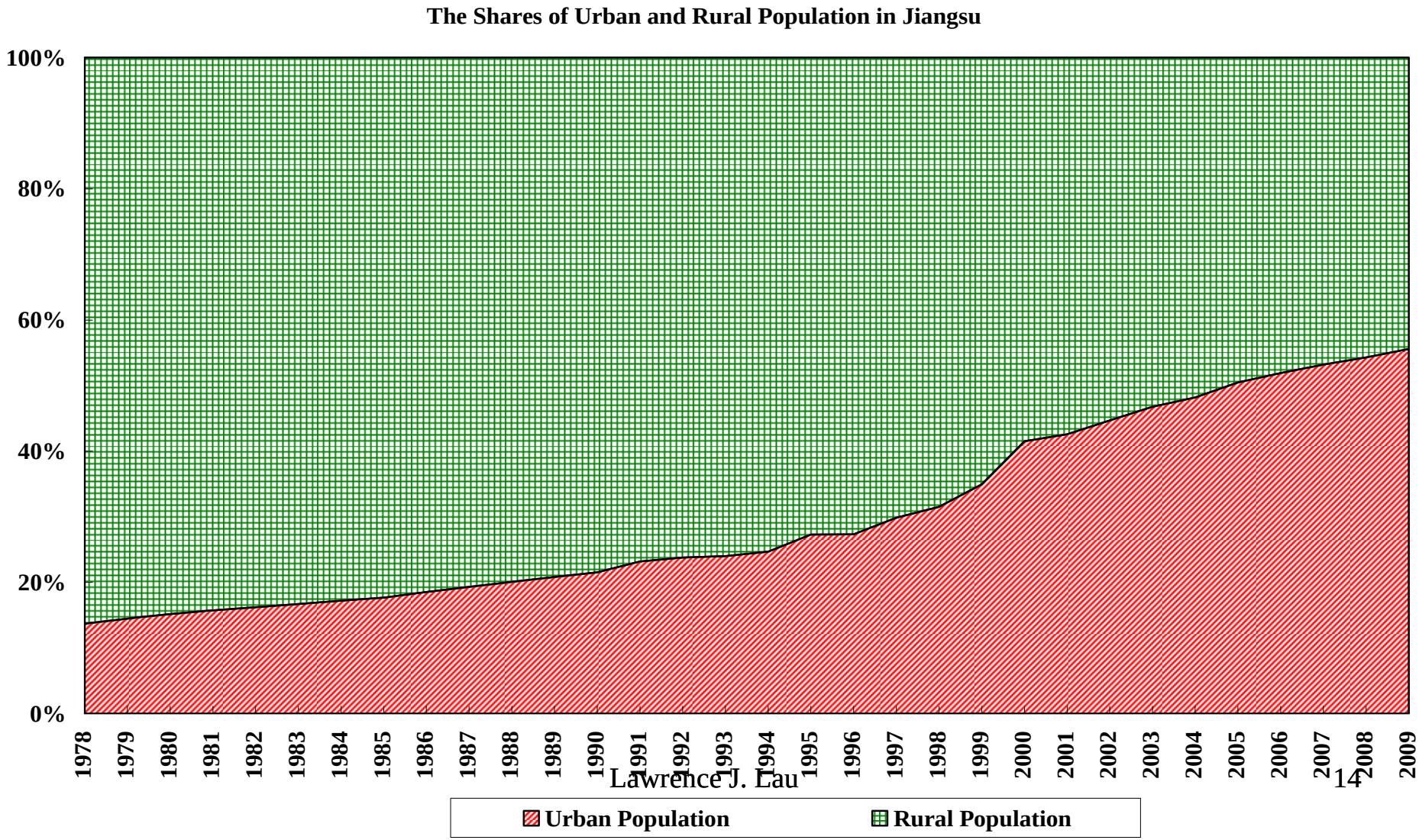
The Comparative Advantages of Jiangsu

- Jiangsu has a developed diversified industrial base that covers light, heavy and high-technology industries. Jiangsu also has built up an excellent infrastructure with links extending not only within Jiangsu itself, but also to other provinces, municipalities and regions, as well as globally through air and sea.
- Jiangsu is also significantly more urbanised than the rest of the country--45.7% of the population lives in the rural areas, compared to the national average of 51%. The national average is expected to decline to 47% by 2015.
- Jiangsu has an excellent location—on the Pacific Ocean and the Yangzi River (Chang Jiang).

The Shares of Rural and Urban Population in China, 1949-Present



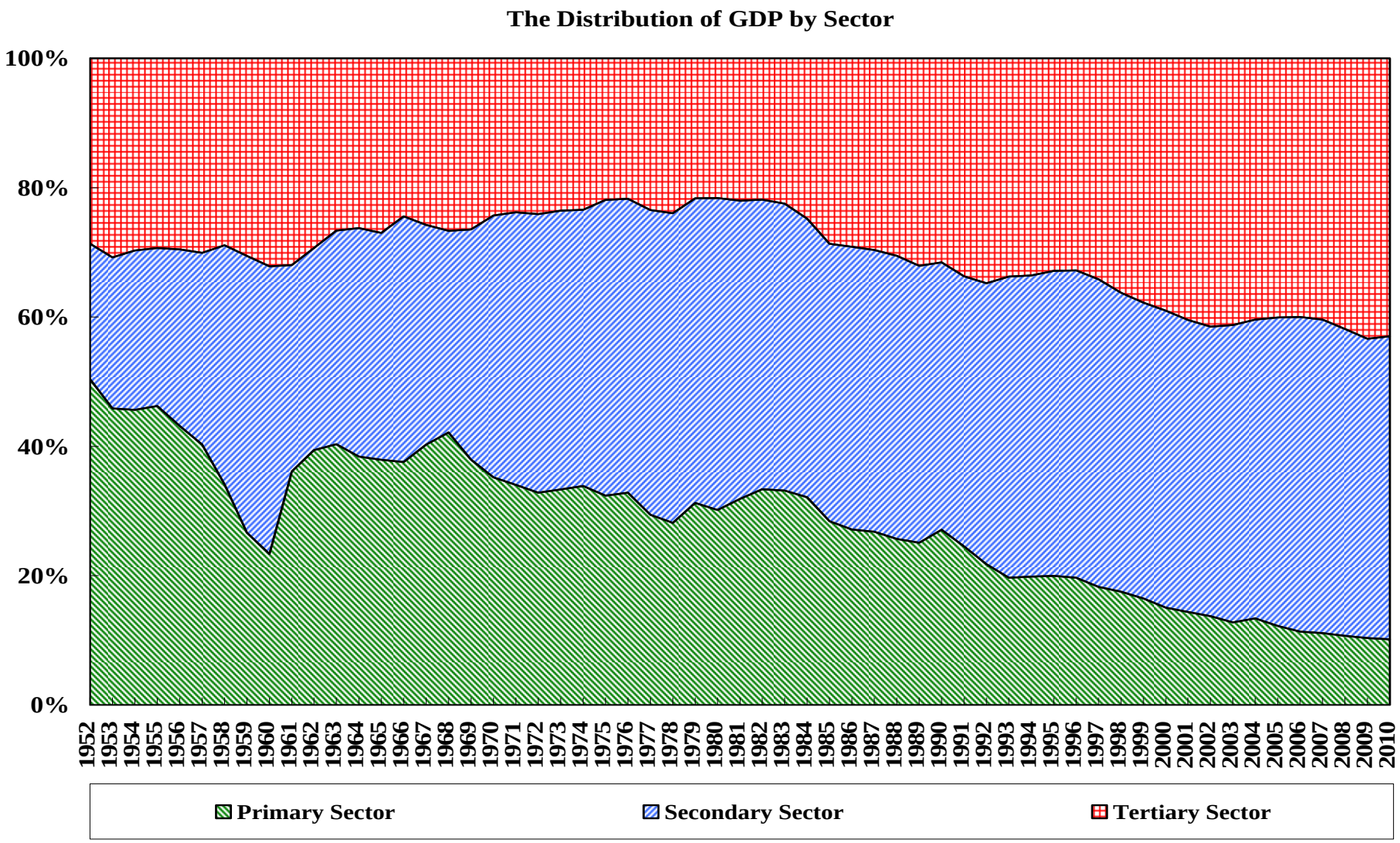
The Shares of Rural and Urban Population in Jiangsu, 1978-Present



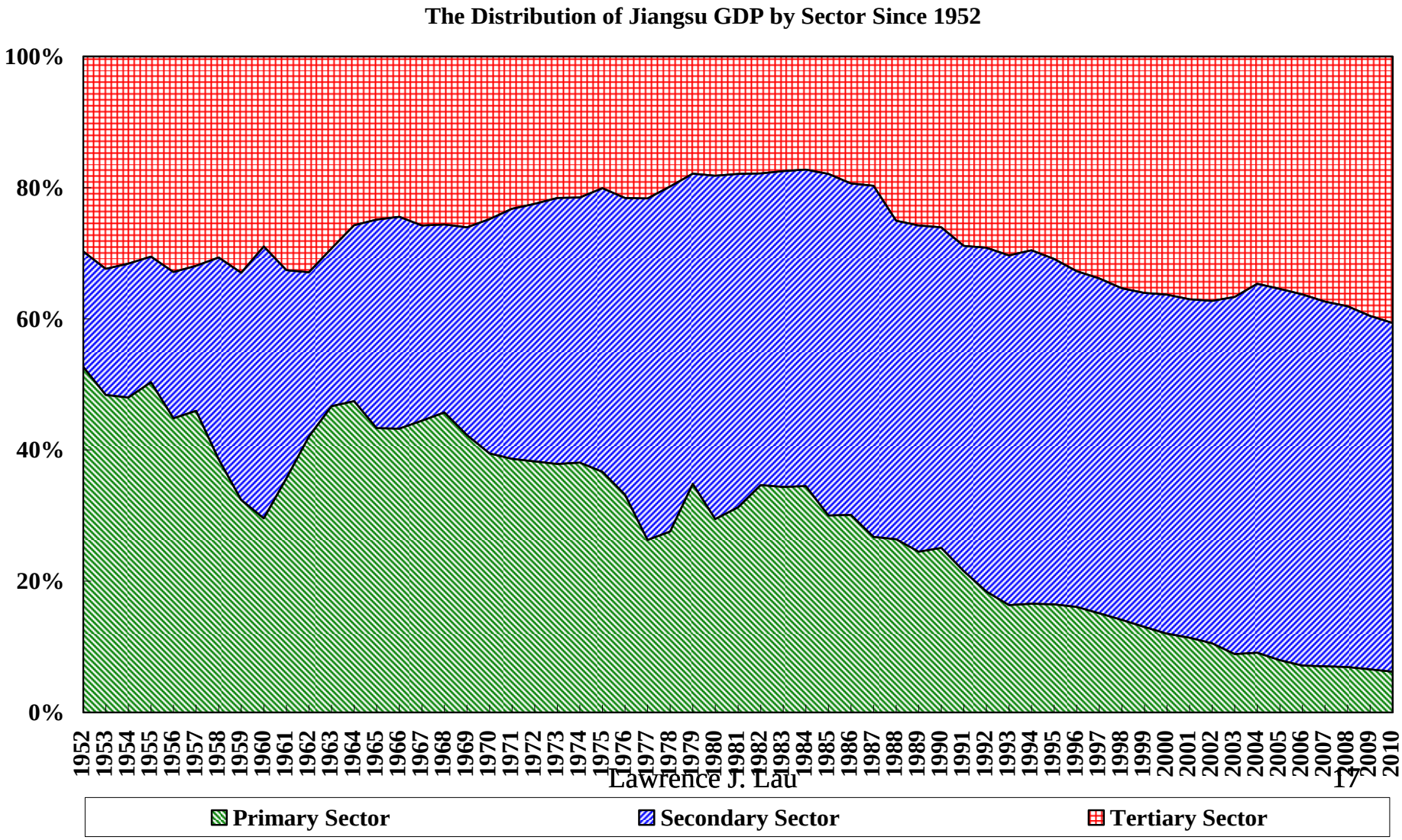
The Comparative Advantages of Jiangsu

- The distribution of Jiangsu's GDP by sector in 2010 is Primary (agriculture) : 6.2%; Secondary (manufacturing, mining and construction) : 53.2% and Tertiary (services) : 40.6%. By comparison, for the nation as a whole, the distribution is Primary (agriculture), 10.2%; Secondary (manufacturing, mining and construction), 46.9%; and Tertiary (services), 43.0%.
- The distribution of Jiangsu's employment by sector in 2009 is Primary: 20%; Secondary: 45% and Tertiary: 35%, compared to 40% in the Primary Sector for the nation as a whole.
- What this means is that while there may still exist some surplus labour in Jiangsu, it is disappearing rapidly and Jiangsu can no longer rely on low-wage, unskilled labour for its future development and growth.

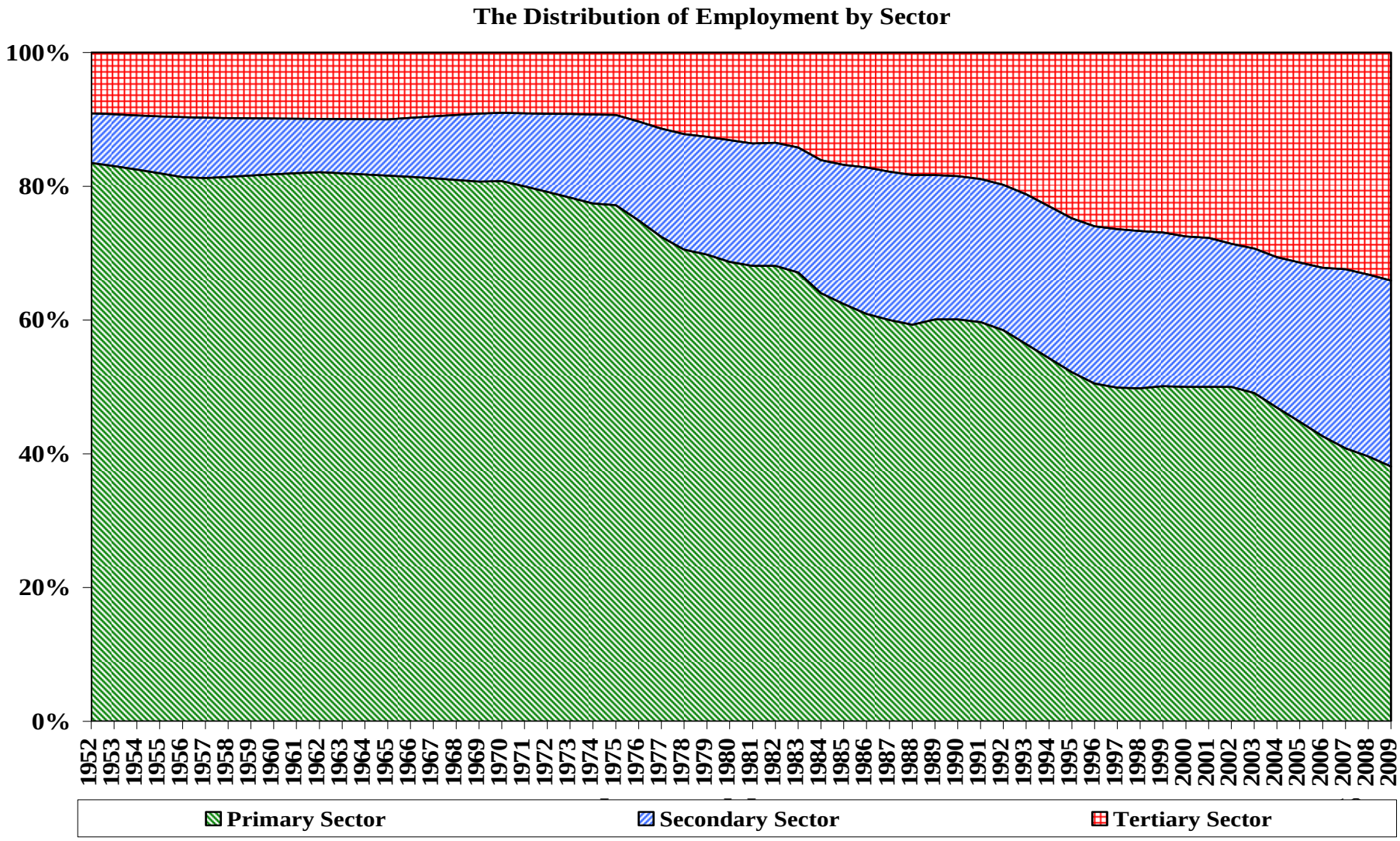
The Distribution of Chinese GDP by Sector Since 1952



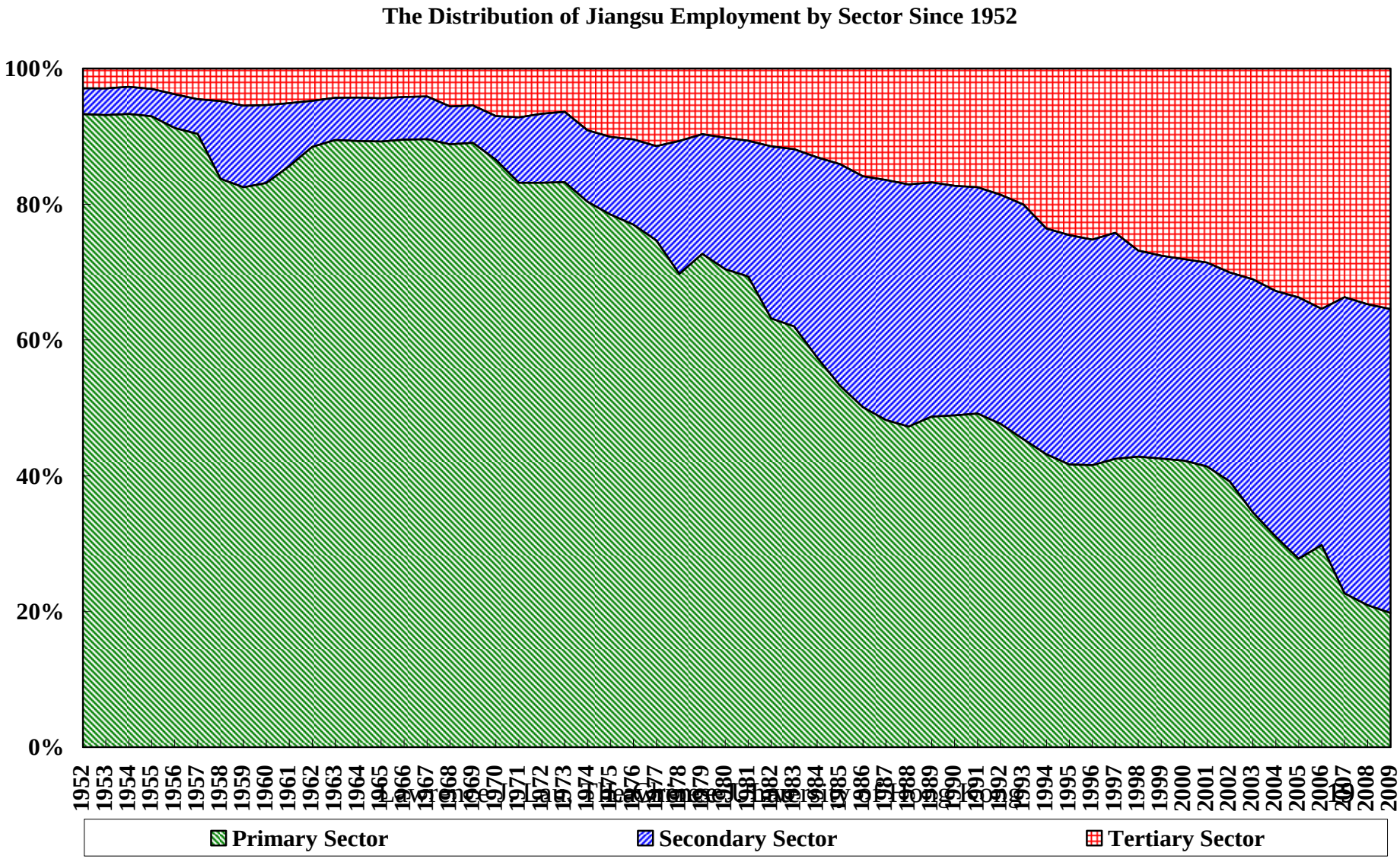
The Distribution of Jiangsu GDP by Sector Since 1952



The Distribution of Chinese Employment by Sector Since 1952



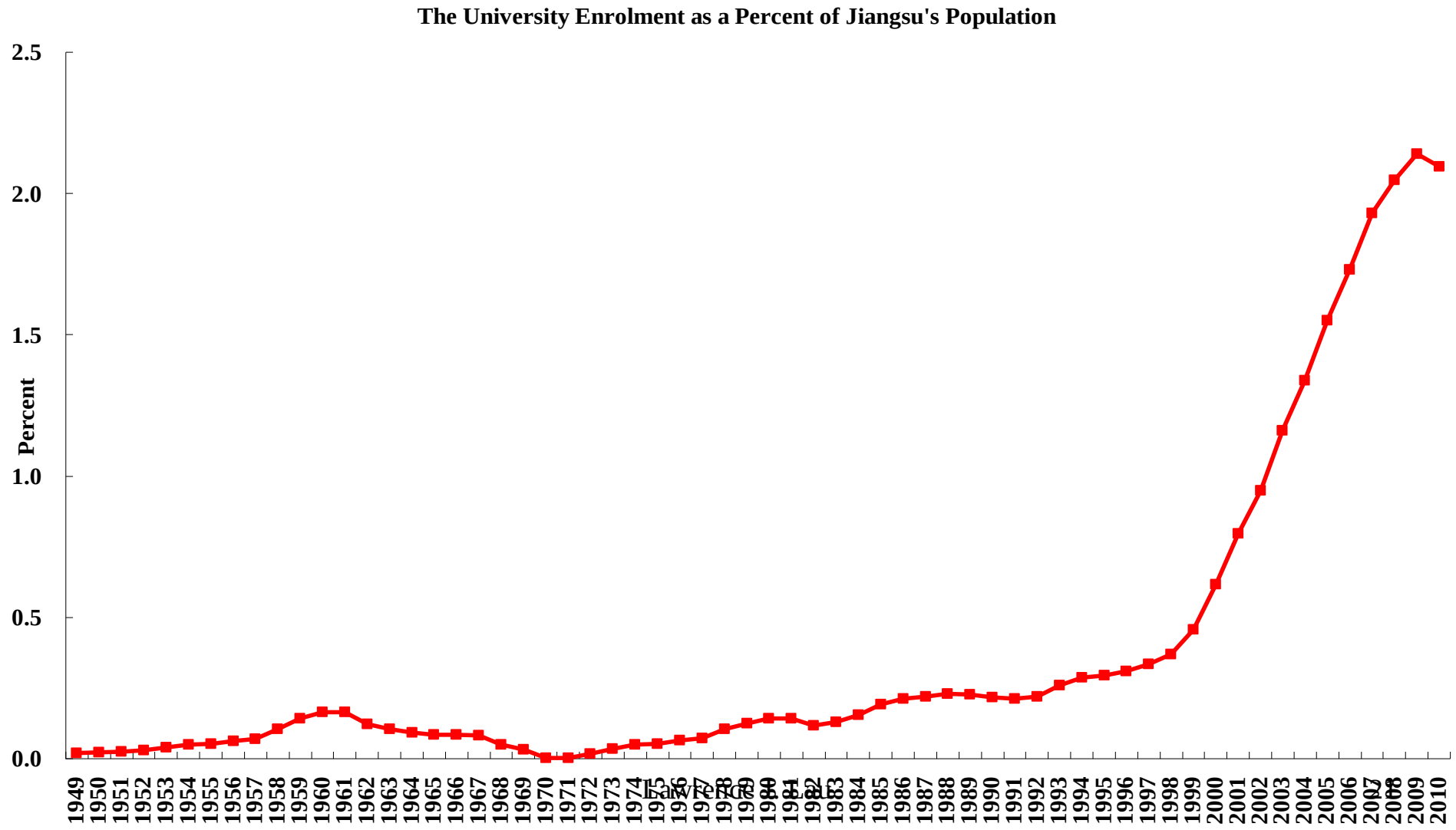
The Distribution of Jiangsu Employment by Sector Since 1952



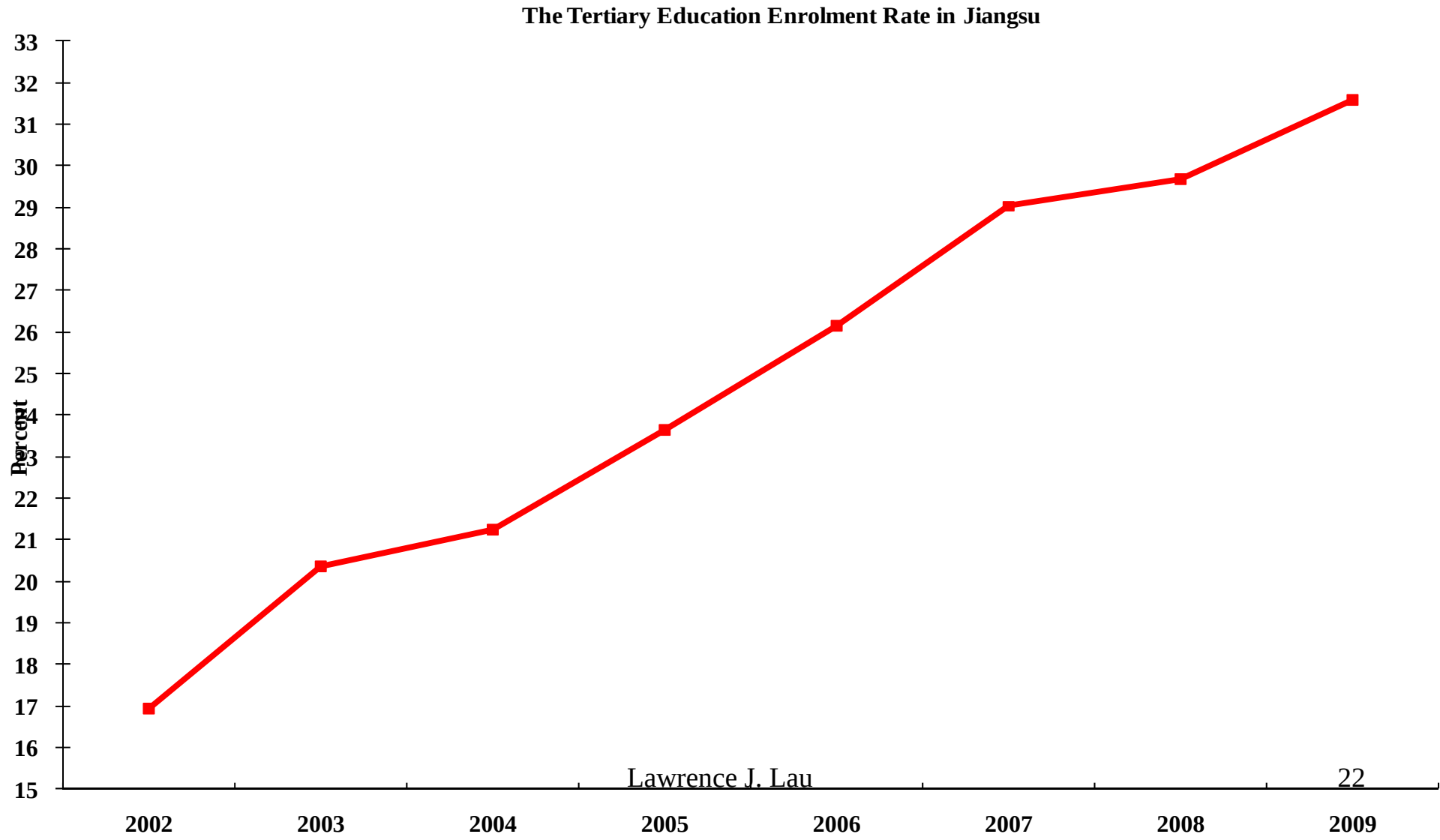
The Comparative Advantages of Jiangsu

- Fortunately, Jiangsu has an excellent educational system. Its enrolment rate at the secondary level is 95.5% and its enrolment rate at the tertiary level is 40.5%, compared to a national average of approximately 25%. Enrolment in tertiary education has been rising very rapidly in Jiangsu since 2000. It is slated to reach 50% in 2015.
- Jiangsu has excellent universities: there are 9 national universities including University of Nanjing and Southeast University; and 19 provincial universities including the University of Jiangsu and the University of Suzhou.
- University of Nanjing is ranked, if not the third, certainly among the top five, of the universities of Mainland China. It publishes the largest number of articles in scientific journals indexed by the SCI Index among universities in China and perhaps even in the World.

University Enrolment as a Percent of Jiangsu's Population



Tertiary Education Enrolment Rate in Jiangsu



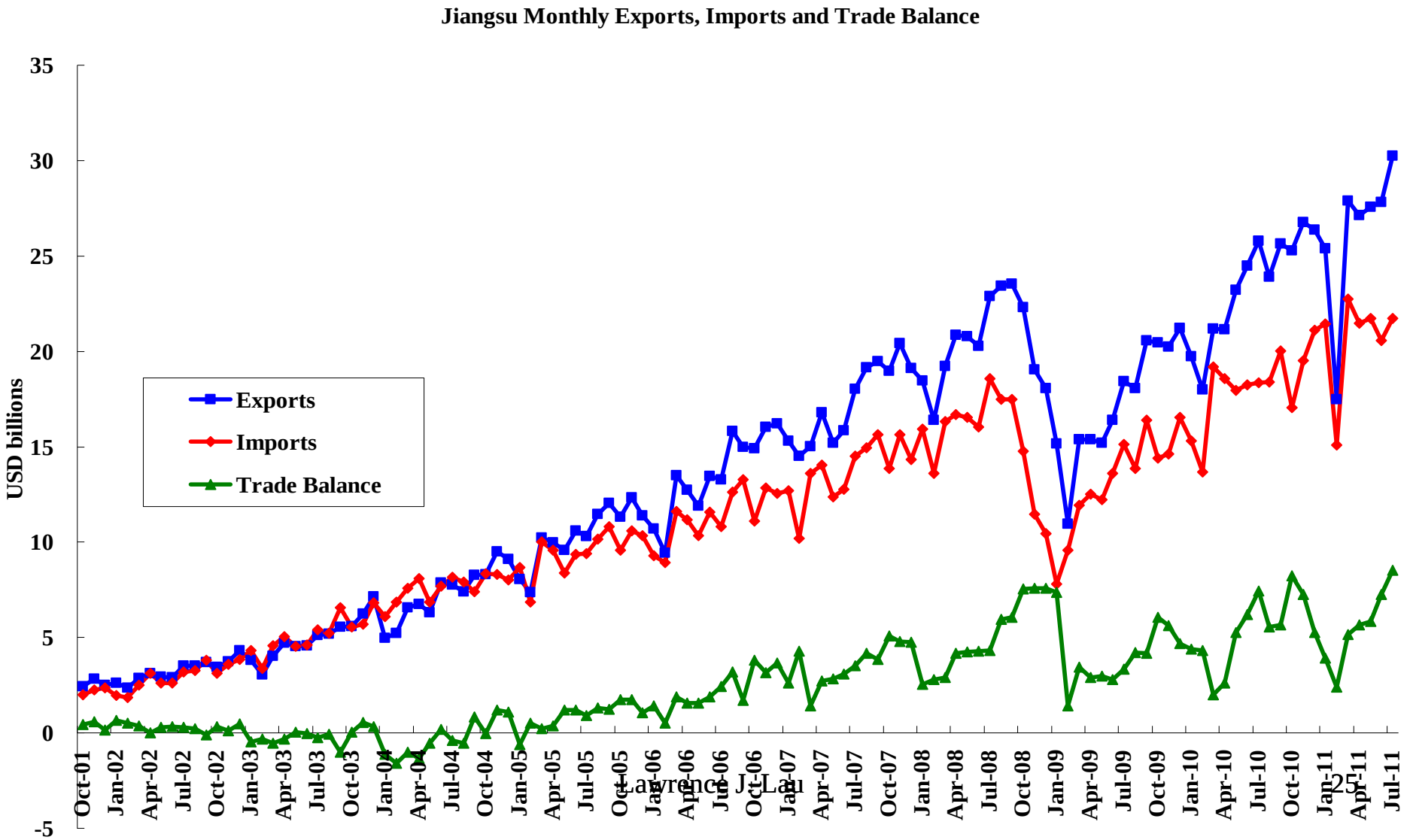
The Comparative Advantages of Jiangsu

- Jiangsu has had a long tradition, dating back a couple of millennia, of culture and scholarship. The people of Jiangsu are honest, industrious and loyal—they are professionally dedicated and not frequent job-hoppers. The labour turnover rate in Jiangsu enterprises is much lower than those in Beijing or Shanghai.
- The Nanjing Foreign Language School (南京外国语学校) is the best institution for the teaching of English and other foreign languages (French, German and Japanese) at the secondary level in China.

The Comparative Advantages of Jiangsu

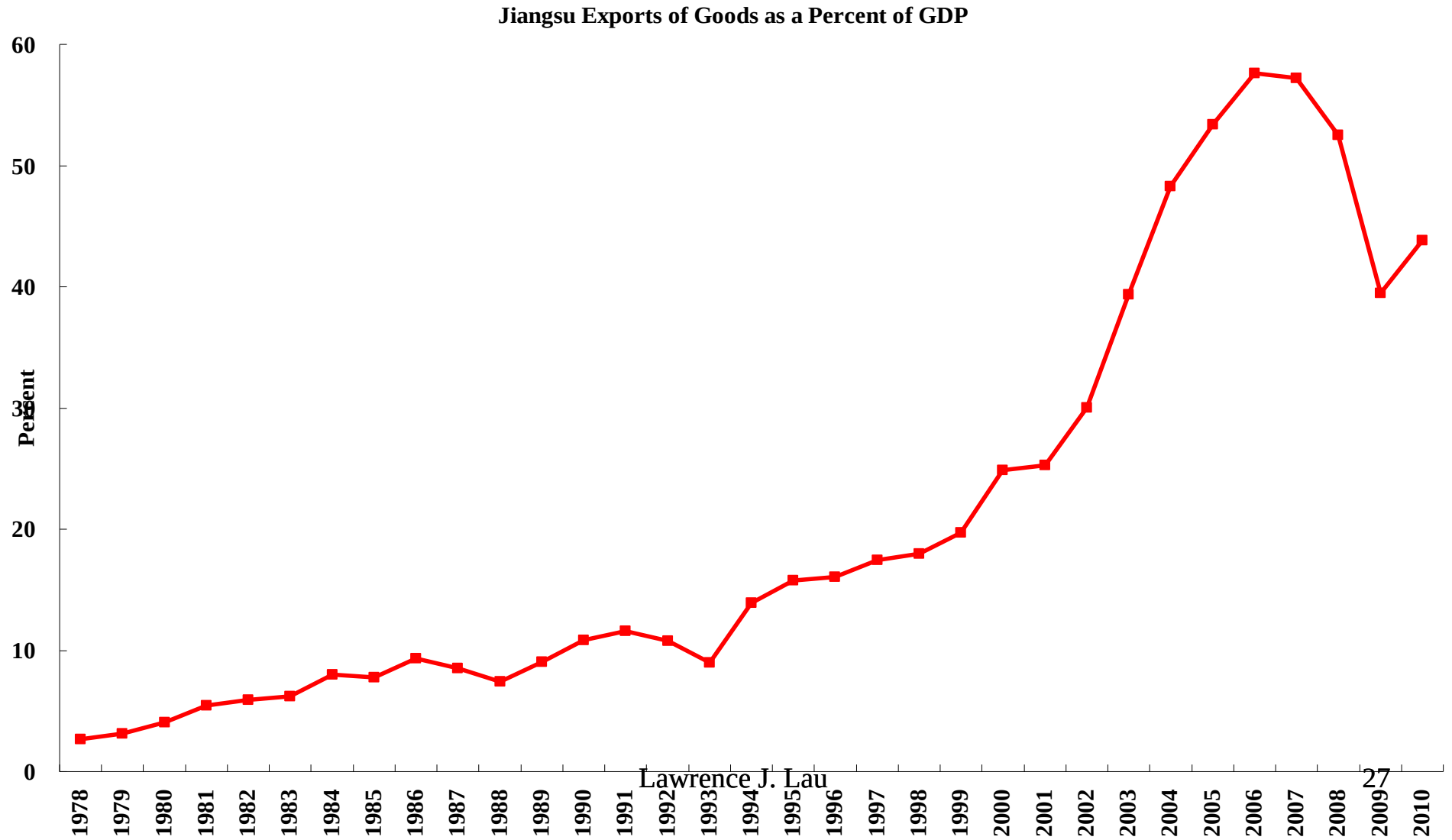
- Jiangsu has long-standing and strong connections with the rest of the World. For example, the University of Nanjing has had a highly successful joint degree programme with Johns Hopkins University for more than twenty years.
- Jiangsu's trade surplus with the rest of the World accounts for most of China's trade surplus. The degree of dependence on exports in Jiangsu is almost twice that of the national dependence. It therefore has every incentive to reorient itself to the huge domestic market, especially given the relatively bleak economic prospects of the United States and Europe in the near term.

Jiangsu Monthly Exports, Imports and Trade Balance, US$

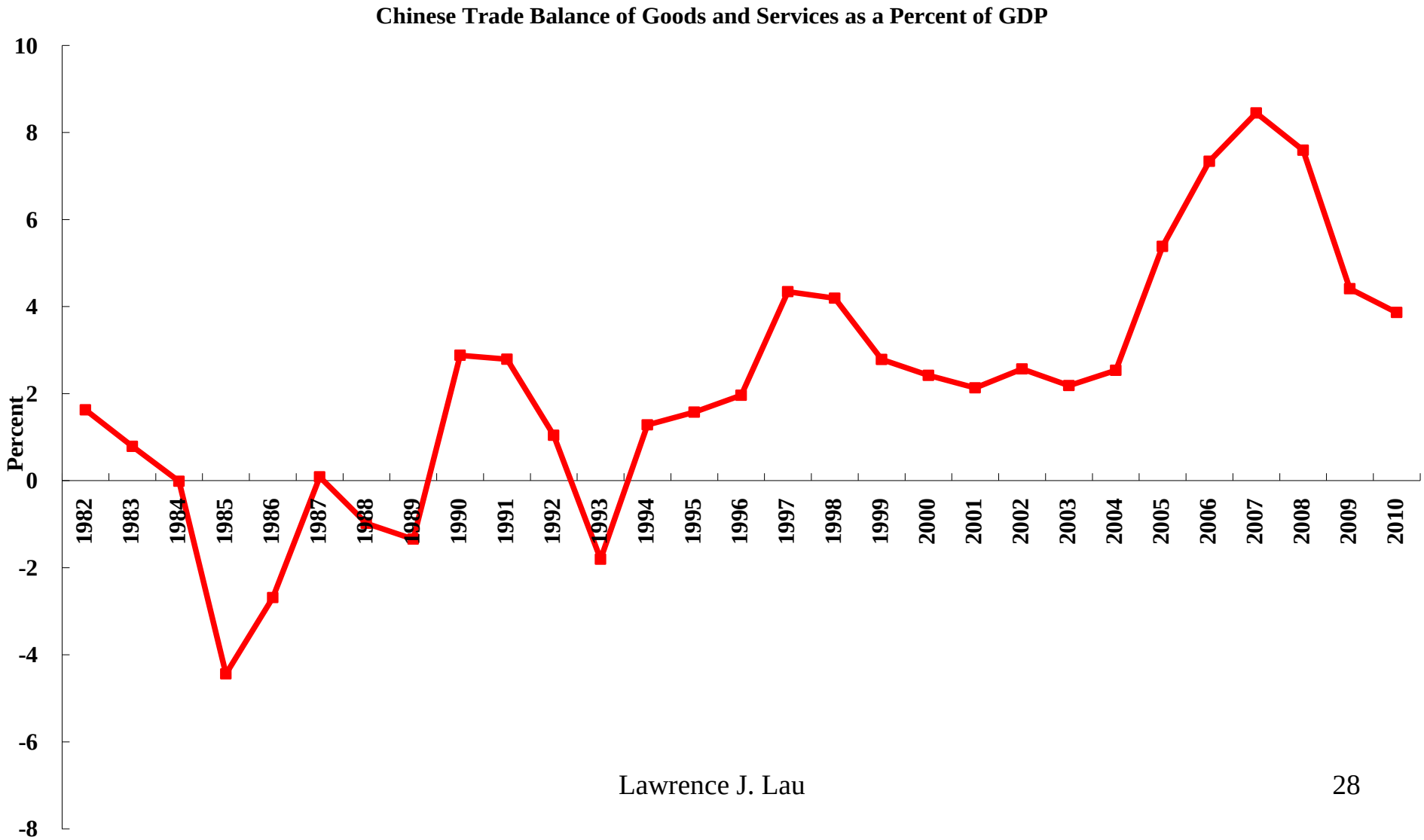


Chinese Exports of Goods and Services as a Percent of GDP, 1970-present

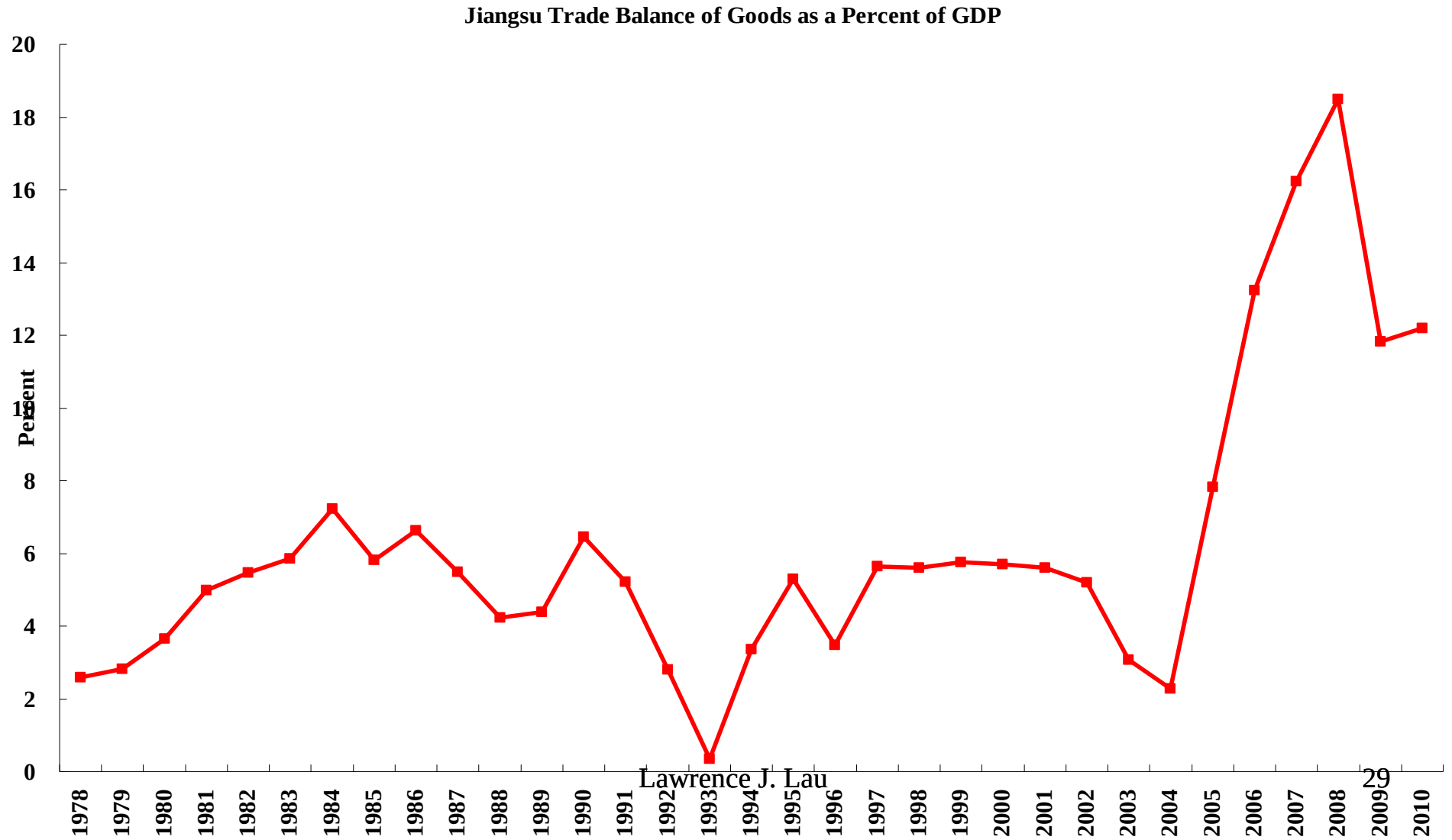
Jiangsu Exports of Goods and Services as a Percent of GDP, 1978-present



Chinese Trade Balance of Goods & Services as a Percent of GDP, 1982-



Jiangsu Trade Balance of Goods as a Percent of GDP, 1978-present



The Comparative Advantages of Jiangsu

- Moreover, given Jiangsu's extensive commercial connections with the rest of the World, enterprises in Jiangsu are also in the perfect position to assist U.S. and European enterprises, especially their small and medium enterprises (SMEs), to enter the Chinese domestic market, bringing to China their products, services, business models and technologies.
- Jiangsu is for many years the largest recipient of foreign direct investment (FDI) into China. Many multinational firms, such as BASF, have been early investors in Nanjing.

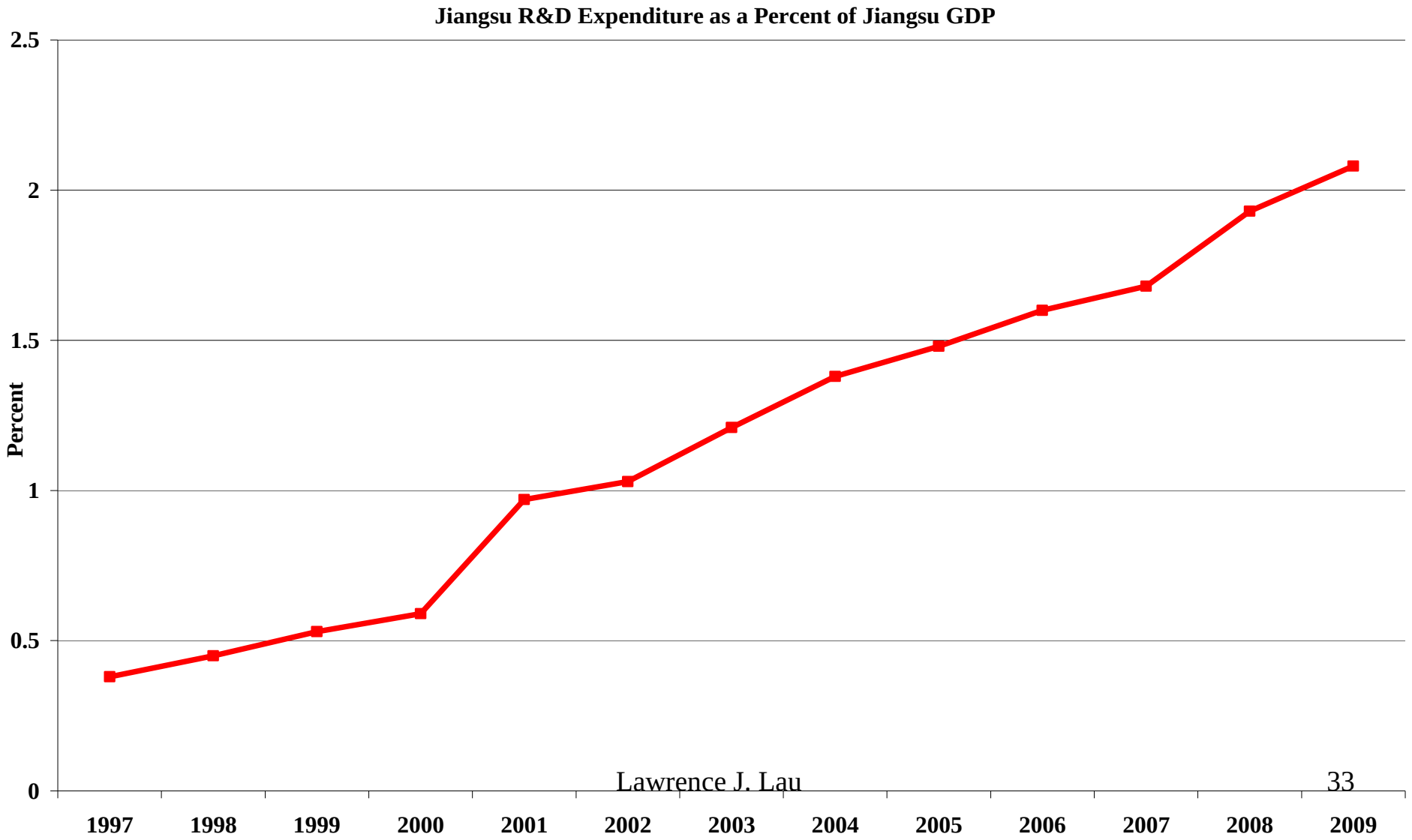
The Comparative Advantages of Jiangsu

- As its rural population declines, and employment in the secondary and tertiary sectors rises, Jiangsu has more usable land for potential expansion.
- The extensive and efficient communication and transportation networks within Jiangsu can help alleviate the shortage of land for non-agricultural use in or near existing major urban centres.

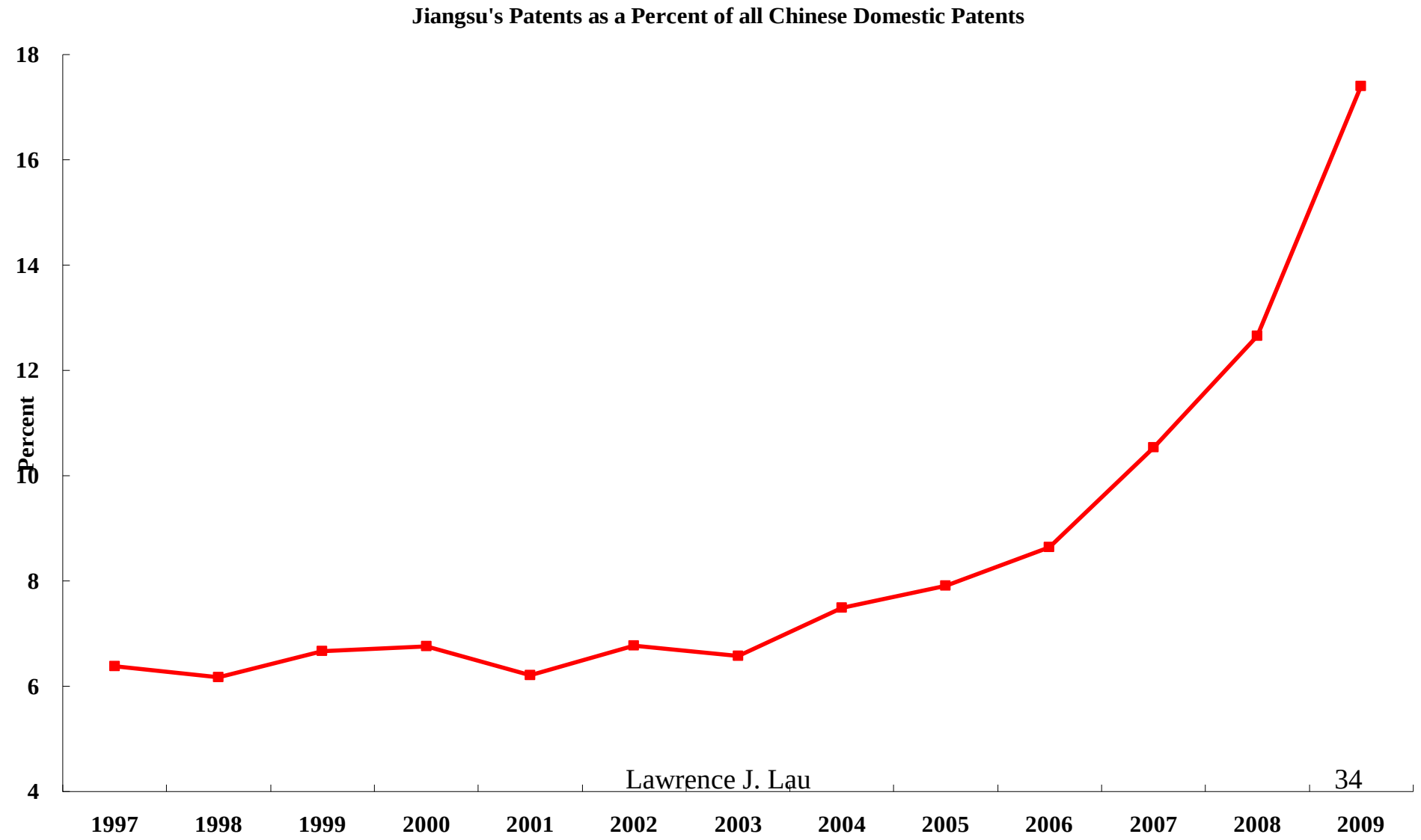
The Comparative Advantages of Jiangsu

- The research and development (R&D) expenditures of Jiangsu, as a share of its GDP, was 2.1% in 2010, higher than the national R&D expenditure to GDP ratio of 1.8%.
- However, Jiangsu's share of Chinese patents granted was almost 18% in 2009, much higher than Jiangsu's share of Chinese GDP of slightly more than 10%.
- While the number of patents obtained does not translate directly and instantly to technical progress, there is indeed a long-term correlation—the more patents obtained, the more innovation.
- Jiangsu has led the entire country in terms of the number of patent obtained in 2009 (more than 87,000).

Jiangsu's R&D Expenditure as a Percent of Jiangsu's GDP



Jiangsu's Patents as a Percent of All Chinese Domestic Patents



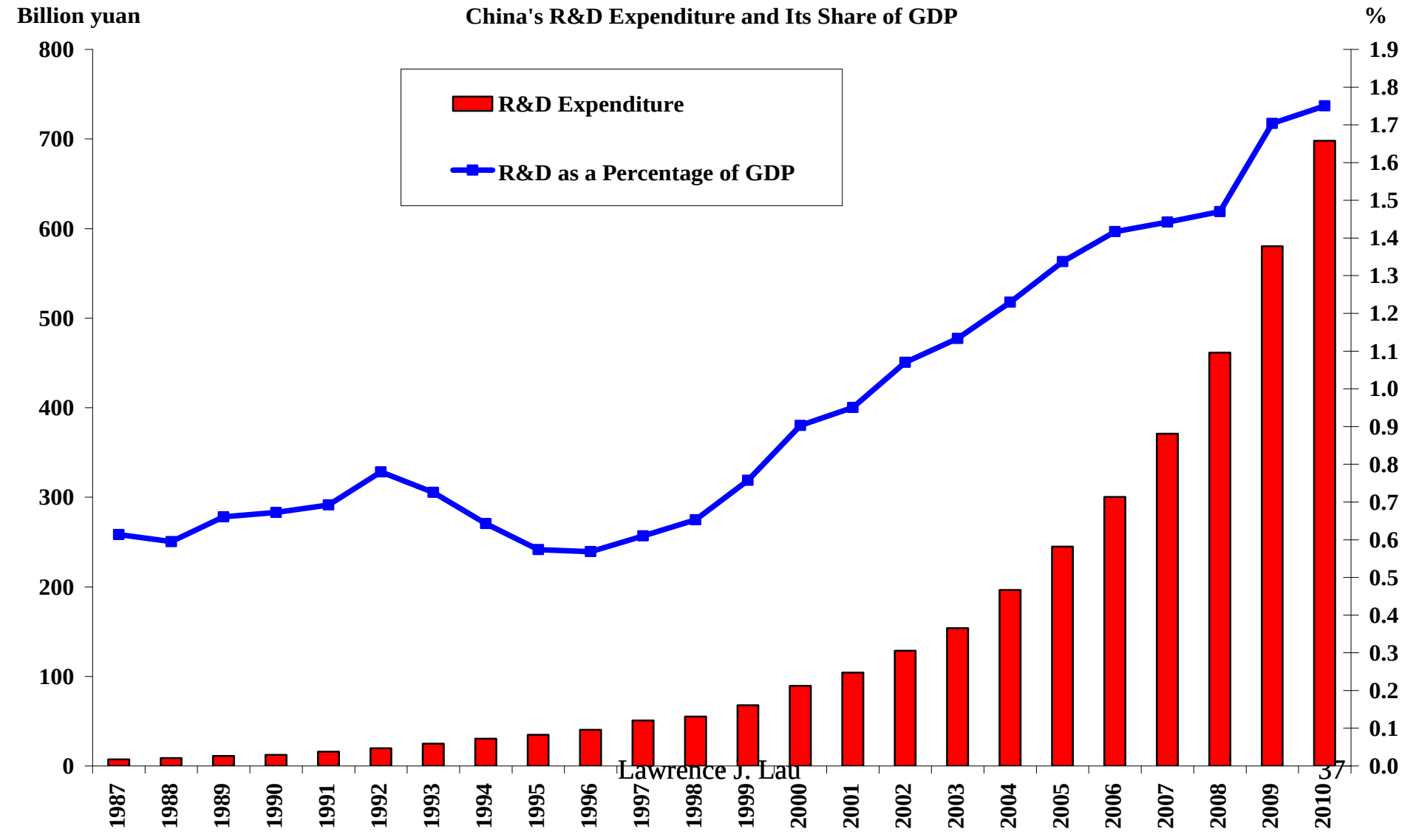
Innovation and Investment in Intangible Capital

- Innovation (technical progress) is the cumulative result of purposeful activities carried out over a long period of time.
- Intangible capital includes human capital (education and training), R&D capital and reputational capital (goodwill, brand-building), which are all critical for innovation.
- Innovation is not limited to invention or improvement of products and processes and can also mean new or improved design and creative industries such as games, publishing and film.

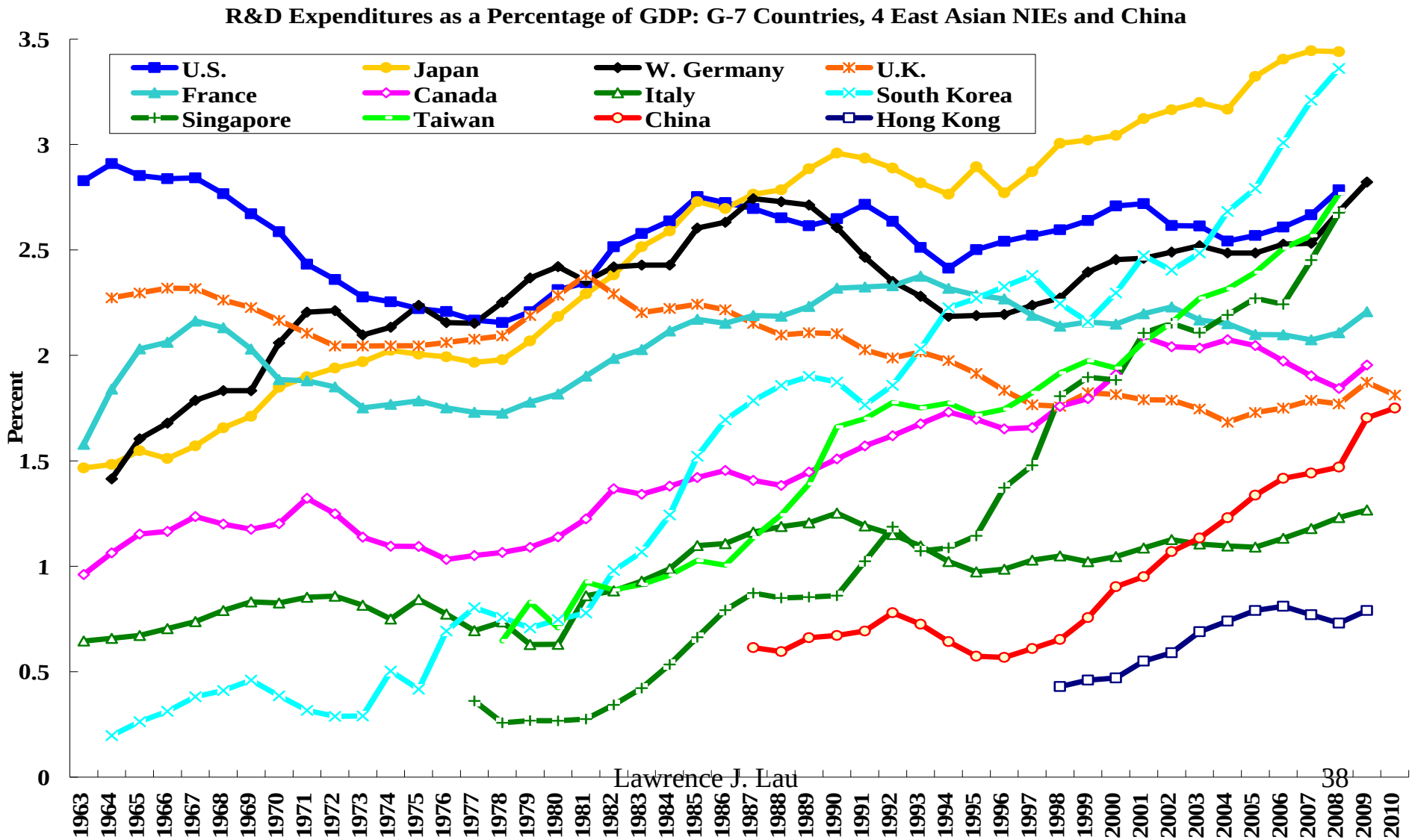
Innovation and Investment in Intangible Capital

- Sustained investment in R&D is essential for innovation in an economy. China (and Jiangsu) have also begun to invest heavily in R&D in recent years--R&D expenditure has been rising rapidly, both in absolute value, and as a percentage of GDP, but still lags behind the developed economies as well as the newly industrialised economies of East Asia.
- The Chinese R&D Expenditure/GDP ratio, 1.8% in 2010, is targeted to reach 2.2% in 2015, still below the historical average for the U.S. of approximately 2.5% since the late 1950s.
- By comparison, both Japan and South Korea invest more than 3% of their GDPs in R&D annually.

China's R&D Expenditure and Its Share of Chinese GDP



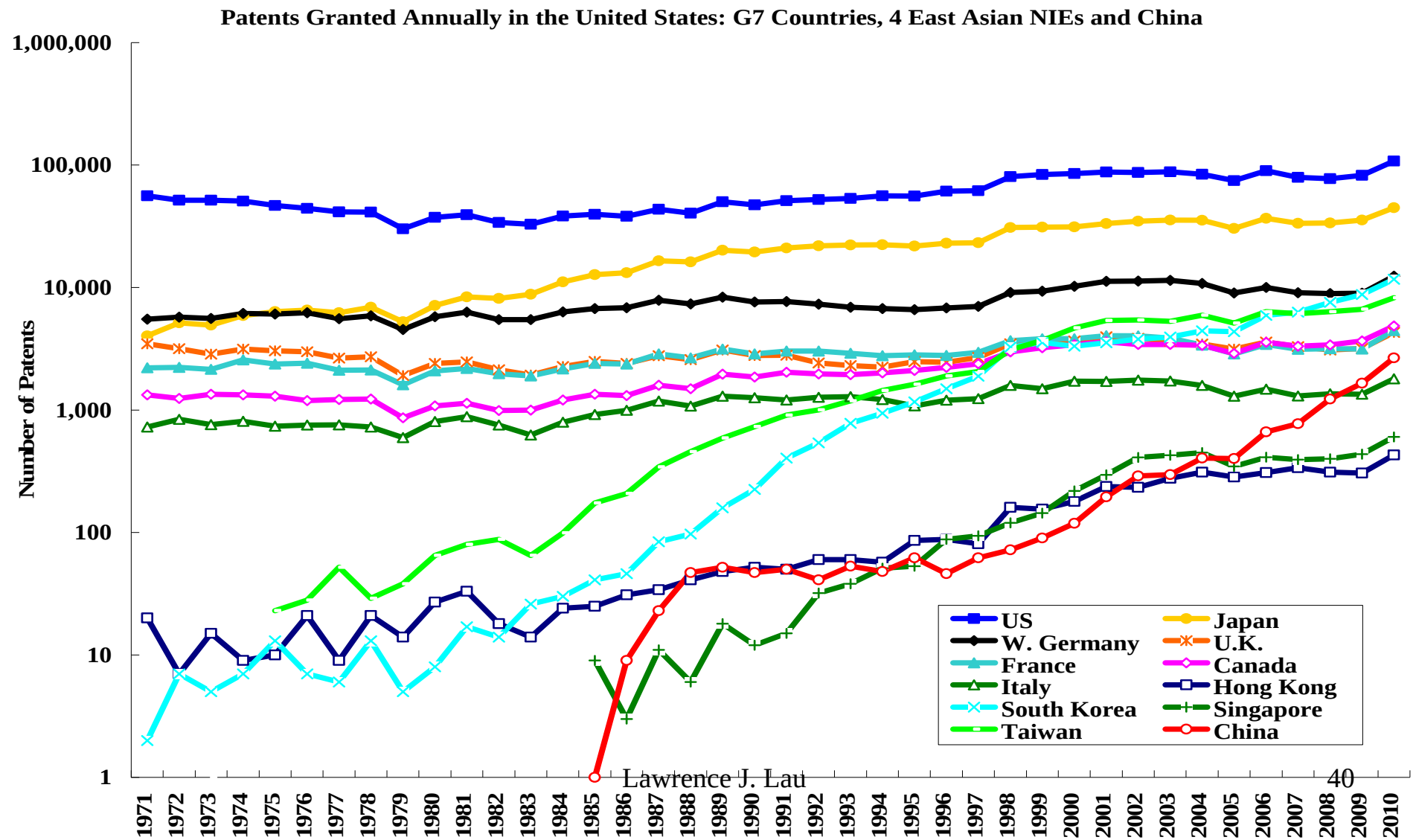
R&D Expenditures as a Ratio of GDP: G-7 Countries, 4 East Asian NIES & China



Innovation and Investment in Intangible Capital

- One indicator of the potential for technical progress (national innovative capacity) is the number of patents obtained each year. In the following chart, the number of patents granted in the United States each year to the nationals of different countries, including the U.S. itself, over time is presented.
- The U.S. is the undisputed champion over the past forty years, with more than 100,000 patents granted in 2010, followed by Japan, with approximately 45,000.
- Since these are patents granted in the U.S., the U.S. may have a home advantage; however, for all the other countries, the comparison across them should be fair.

Patents Granted in the United States: G-7 Countries, 4 East Asian NIEs & China



Innovation and Investment in Intangible Capital

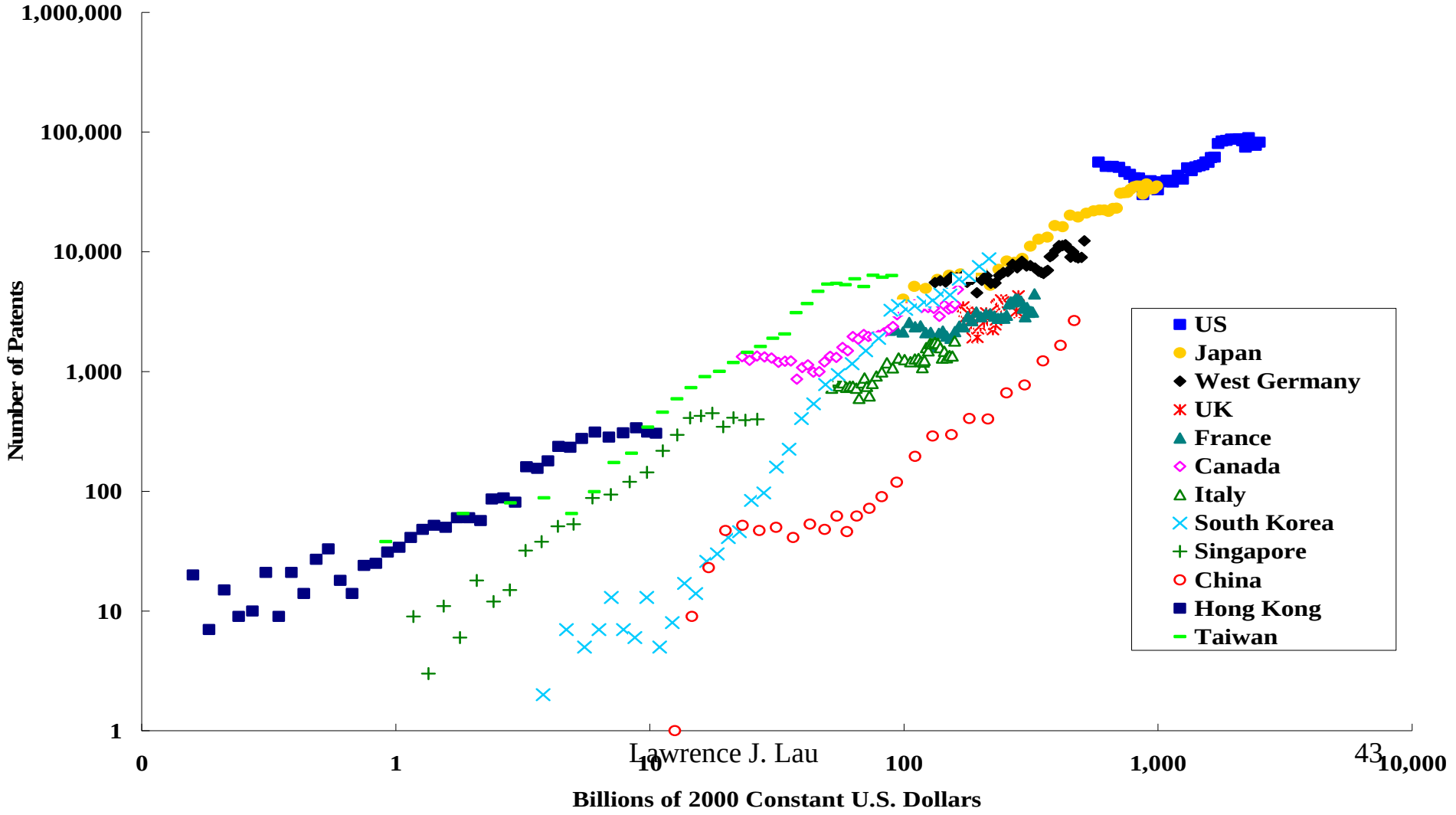
- The number of patents granted to Chinese applicants each year has increased from 1 in 1985 to 2,657 patents in 2010.
- South Korea and Taiwan are still ahead of China in terms of the number of patents granted in the U.S., with 11,671 and 8,238 patents in 2010 respectively.
- On a per capita basis, China obtained 0.000002 patent granted in the U.S. per person in 2010.
- If patents granted by all national sources are also included, Jiangsu obtained 0.0425 patent per person, compared to 9.94 for Japan, 7.79 for South Korea and 2.89 for the U.S. (Jiangsu's population is lower than those of Japan and the U.S., but higher than that of South Korea.)

Innovation and Investment in Intangible Capital

- The stock of R&D capital, defined as the cumulative past real expenditure on R&D less depreciation of 10% per year, can be shown to have a direct causal relationship to the number of patents granted (see the following chart, in which the number of patents granted is plotted against the R&D capital stock for each country and each year).
- The causal relationship between the stock of R&D capital and the number of patents granted is unmistakable. However, there are variations in the ability and efficiency of obtaining patents in the U.S., given the same level of R&D capital stock. For example, at the same level of R&D capital stock, China obtains far fewer patents than the other countries and regions.

Patents Granted in the United States and R&D Capital Stocks, Selected Economies

Figure 8.4: The Number of U.S. Patents Granted Annually vs. R&D Capital Stocks



Division of Labour in Research and Development

- In looking at R&D, one should distinguish among basic research, applied research, and development. And there is also pilot commercialisation. For sustainable innovation-based economic growth, all these types of activities are necessary. However the financing methods for the different types of activities are different.
- Basic research generates returns only in the very long run, and in a diffused fashion. Profit-making enterprises cannot be expected to support basic research. Basic research can therefore only be financed by the Government, although one can take advantage of the spillover from national defence-related research.
- Applied research can be financed within enterprises privately or at universities and research institutions either privately or publicly or both.

Division of Labour in Research and Development

- Development and pilot commercialisation are mostly financed privately within enterprises or start-up firms with venture capital funds.

Innovation and Investment in Intangible Capital

- Reputational capital is also an important form of intangible capital. Building brands is a pre-requisite for Chinese enterprises to re-orient themselves to take advantage of its own huge domestic market. It is true that investment in goodwill and brand-building requires resources, but it also enables the owners of brand names to have much more pricing power and higher profit margins than enterprises that do only OEM (original equipment manufacturing) business.

Building Brands—Software Enterprises in Nanjing

- The three enterprises in the World with the largest software revenue are Microsoft, IBM and Oracle Corporation, in that order. They all have employment of over 100,000 worldwide and revenue in the tens of billions of U.S. Dollars.
- SAP AG is a German global software firm that provides enterprise software applications and support to enterprises large and small on a global basis. It was the largest enterprise software company in the world as of 2009.
- TCS, Infosys and Wipro, the three largest Information Technology (IT) firms in India, all have annual revenues greater than or equal to US$5 billion and are all ranked within the top 30 of IT firms in the World. The top 8 such Indian firms all have annual revenue of more than US$1 billion.

Building Brands—Software Enterprises in Nanjing

- Nanjing has great potential of becoming an international software development centre like Bangalore. However, its software enterprises must grow much bigger and at the same time try to build their brands in order to compete effectively. In a sense, for software enterprises, size, in terms of past revenue, is also an important dimension of branding. Scale also connotes permanence and hence reliability.
- The proficient use of English is also an advantage of the Indian software enterprises. This is also an area where software enterprises in Jiangsu should emulate. Jiangsu should promote and encourage the use of English in software enterprises.

Building Brands—Software Enterprises in Nanjing

- Jiangsu should also encourage mergers and acquisitions among the software enterprises in Jiangsu, and perhaps even encourage them to merge with or acquire other international software firms.
- For example, the Government of Jiangsu can require that software enterprises bidding for the Provincial Government's business must have a minimum scale in terms of permanent staff and annual revenue. And the standards can be raised over time. Only in this way can software enterprises in Nanjing achieve a scale and reputation that will enable them to compete effectively in the global market.

Upgrading Jiangsu through the Application of Science and Technology

- As China transforms from export-oriented to domestic-demand-oriented growth and from input-driven to innovation-driven growth, Jiangsu is in a uniquely advantageous position.
- First, Jiangsu can be an important source of the potential growth in Chinese domestic aggregate demand on account of its higher income per capita, educational attainment and level of cultural development.
- Second, Jiangsu can also be an important source of supply, taking advantage of its strengths in manufacturing, in science and technology, and its long-standing close links to the rest of the World.

Upgrading Jiangsu through the Application of Science and Technology

- Jiangsu can play a leading role in the following areas:
- (1) Design, development and supply of smart and green housing and its components and derivative products;
- (2) Application of high technology in the education and health care sectors;
- (3) Provision of a smart urban infrastructure;
- (4) Environmental protection, preservation, monitoring, testing and certification.

Smart and Green Housing

- Jiangsu can take the lead in the following two initiatives:
- (1) The design, development and supply of smart, space-efficient and energy-saving residential units, with lower costs for heating, cooling and lighting as well as provision of electricity and hot water, and/or their components.
- (2) The design and manufacture of energy- and space-saving electrical appliances, such as refrigerators, stoves, washing machines, and television sets, green and space-saving furniture and other household devices and goods.
- Space-saving is important as land has become a most valuable commodity in China (and Jiangsu). Appropriate design can make residential space much more efficient and appear and feel bigger. Miniaturisation and smart design can make appliances much more energy- and space-efficient as well as user-friendly.

Smart and Green Housing

- Energy-efficient residential structures and appliances in general will have a higher capital costs but lower life-cycle operating costs. Developers and consumers can be encouraged to use energy-efficient construction, equipment and appliances if the Government can offer incentives such as low-cost credit for the financing of the additional capital costs. This will enable the developers to choose energy-efficient but higher capital-cost alternatives and the consumers can share in the gains.
- For example, the additional cost of using double-paned instead of single-paned windows can be financed through a separate government-subsidised loan over and above the standard residential mortgage loan.

Application of High Technology in the Education and Health Care Sectors

- Jiangsu should adopt a policy of assuring low-cost or no-cost access to the internet by all students in China everywhere, all the way down to the primary school level. Promoting and making universal the notebook computer or tablet device is one way to achieve this goal. Many Chinese households are able to afford notebook computers or tablet devices—the difficulty is having inexpensive and ready access to the internet.
- Distance learning is another educational activity that can be promoted, making educational resources available to the entire Province.

Application of High Technology in the Education and Health Care Sectors

- Making the internet accessible, available and affordable everywhere will greatly narrow the inequality of education (and information) between the urban and rural areas and reduce the so-called digital divide between the rich and the poor.
- It will be a great equaliser, because once on the internet, everyone is equal. For examples: a student in the rural area will have more or less the same access to information as a student in the urban area; large and small enterprises will compete more or less equally on the internet.
- This will also create a great deal of domestic demand for the high-technology sector which has faced a sharp and possibly long-term decline in its export markets.

Application of High Technology in the Education and Health Care Sectors

- Public health and preventive medicine should be widely promoted. Information can be disseminated through the internet.
- One can apply high technology to early diagnostic tests and to distance delivery of medical services, including surgery.

Provision of a Smart Urban Infrastructure

- Smart urban infrastructure includes a smart provincial power grid, optical fibre networks that connect enterprises, households and government organisations within and across cities, and smart inter-urban and intra-urban mass transit systems.
- In order to economise on the use of the scarce land resources, and to assure the efficiency and environmental friendliness of the urban communication and transportation system, high density land use should be mandated in all the cities. China and Jiangsu cannot afford to have free-standing single-family houses with a yard for every household.
- Central planning of new cities, with regard to their locations, layouts, land use, densities, and intra-urban communication and transportation infrastructure, is necessary. Left entirely to the market, the result will be urban sprawls and slums, a heavy reliance on the private automobile, and expensive high-speed digital communication.

Provision of a Smart Urban Infrastructure

- Mass-transit systems should be the principal means of intra-urban transportation for existing as well as new cities, and as mentioned above, this requires planning and cannot be left to the market. Only mass-transit systems can provide the alternative to the widespread use of the automobile. "A car in every garage" would be a nightmare for China and for the World. Cities should be planned so that the residents do not require the use of an automobile in their everyday life (although they may well own an automobile for weekend and leisure use).

Environmental Protection, Preservation, Monitoring, Testing and Certification

- Jiangsu is committed to the reduction in energy consumption per unit output as well as carbon emission. It is committed to the improvement of the quality of the environment, including air and water.
- China has an advantage in introducing technologies for green or greener vehicles because it has relatively little sunk costs. (An electric car consortium has been formed recently to develop an electric car suitable for China.) China also has a substantial incentive in developing clean coal technologies, having large coal reserves itself. Jiangsu can make important contributions to these efforts.

Environmental Protection, Preservation, Monitoring, Testing and Certification

- Jiangsu can also introduce and promote alternative renewable and clean sources of energy, such as solar power and wind power based on its own demand. However, the most promising directions are in energy conservation—the energy consumption/GDP ratio in China is still too high relative to other economies at a similar stage of economic development—and in the increased utilisation of hydro-electric and safe nuclear power for electricity generation.
- Monitoring of the environmental quality can be facilitated with the intelligent use of high technology.
- Similarly, high technology can be applied to the testing and certification of foods and drugs, the safety of which is a top national priority.

Policy Recommendations—Enhancing Intangible Capital (R&D Capital)

- Jiangsu should consider increasing the R&D expenditure to GDP ratio to 3.0% by 2015 (the current Provincial Twelfth Five-Year Plan calls for 2.5%) and to 4.0% by 2020. For the Chinese nation as a whole, the target for 2015 under the Twelfth Five-Year Plan is 2.2 percent. For both Japan and South Korea, the R&D expenditure to GDP ratio exceeds 3 percent. Shenzhen aims to achieve an R&D to GDP ratio of 7 percent by 2015.
- Not all of the increase R&D expenditure needs to be financed by Jiangsu itself. Researchers in Jiangsu can and should compete for national as well as international R&D resources. Enterprises in Jiangsu can also be encouraged to undertake more R&D through tax incentives.

Policy Recommendations—Enhancing Intangible Capital (R&D Capital)

- The Government of Jiangsu should increase its support of basic research, mostly at the leading universities, as returns will be too long-term and diffused for private financing but basic research will lay the foundations for successful innovation in the future.
- One reason that Japan lags behind the U.S. in innovation is because of the inadequate support for basic research.
- The Government of Jiangsu should also consider subsidising the application and maintenance of patents granted to Jiangsu residents in foreign countries.

Policy Recommendations—Enhancing Intangible Capital (Reputational Capital)

- Jiangsu should encourage the building of brands by enterprises in Jiangsu both domestically and internationally.
- It should also support the development of Nanjing as the software development centre of China and East Asia by encouraging the emergence of larger and branded software enterprises .

Policy Recommendations—Enhancing Intangible Capital (Human Capital)

- Quantitatively speaking, development of education at all levels in Jiangsu is already at the top of the nation. It is therefore time to focus on improving the quality of the education.
- The quality of education can be improved by recruiting high-quality teachers and high-quality students. High-quality teachers attract high-quality students, who in turn attract high-quality teachers, thus setting off a "virtuous circle."
- The Government should facilitate the recruitment of scientific and technical manpower of the highest caliber globally through special and endowed professorships (with higher salaries)—this will not only increase the R&D output of Jiangsu but will help attract the best post-doctoral, graduate and undergraduate students from all over China and the World.

Policy Recommendations—Enhancing Intangible Capital (Human Capital)

- Nanjing University can take a page from the Federal Institute of Technology (ETH) in Zurich, Switzerland. ETH is possibly the best research university in continental Europe. It has produced 23 Nobel Laureates. (Prof. Albert Einstein was an alumnus of ETH.)
- ETH has a special framework for attracting and retaining scientists of the highest caliber. Once a senior Professor is recruited to ETH, he or she will be given, in addition to salary and fringe benefits, an annual research grant which can be used to support his or her research until retirement from ETH. This steady funding allows the faculty members to engage in fundamental research that may take a long time to come to fruition.

Policy Recommendations—Enhancing Intangible Capital (Human Capital)

- The best universities in Jiangsu should be encouraged to increase the enrolment of graduate students in Master and Ph. D. programmes from all over China and the World. This is the strategy used by the United States in attracting the best talents from around the World to the U.S.
- Most of these foreign students come from three countries—China, India, Russia. These countries bear the full costs of raising as well as the kindergarten through university education of their citizens, and the United States gets to select their best by offering admission and financial aid. This is a most cost-effective approach for the United States.
- Jiangsu should try to do the same with other Chinese provinces, countries and regions. However, this also means Jiangsu must maintain high-quality, systematic graduate programmes.

Policy Recommendations—Enhancing Intangible Capital (Human Capital)

- Jiangsu can consider offering scholarships covering tuition and living and travel expenses to attract the best out-of-province undergraduate students. It can also try to change the system of undergraduate admission at its universities—so that it is fully merit-based as opposed to dependent on whether a university is the applicant's first choice.
- Moreover, considering the already high tertiary education enrolment rate in Jiangsu (over 40 % and rising to 50% by 2015), Jiangsu should encourage the differentiation of the roles of the different universities and other tertiary educational institutions. While the very best universities such as Nanjing University and Southeast University should continue to be comprehensive and research-based, some of the other tertiary educational institutions may want to focus on providing its undergraduate students with employable knowledge, skills and experiences upon their graduation. Greater coordination between these institutions and the potential large employers will rebound to the benefits of the students, the educational institutions, and the enterprises potentially employing the students.

Policy Recommendations—Enhancing Intangible Capital (Human Capital)

- Jiangsu should set as its goal the elevation of one of its universities into a world-class comprehensive research-based university. One way to accelerate this process is to combine the strengths of both Nanjing University and Southeast University, which used to be one university. (The combined university can be named Jinling University (金陵大学).) It will then easily become one of the top three universities in China, perhaps even the best.
- The Government of Jiangsu should consider granting a direct annual subsidy to Nanjing University, in return for a special quota of admission for students of Jiangsu Province, as the Government of Shanghai has done for Fudan University.

Policy Recommendations—Enhancing Intangible Capital (Human Capital)

- The educational authorities of Jiangsu should try to encourage creativity and originality and an inquisitive attitude in classrooms. Students should be respectful but should not hesitate to challenging established scientific authority if warranted (just like Albert Einstein challenged Isaac Newton's assumptions).
- Efforts should be made to improve the quality of the teaching of English in Jiangsu and promoting the use of English as a second language throughout the Province.

Policy Recommendations—Enhancing Intangible Capital (Social Overhead)

- The Government of Jiangsu should encourage, promote, facilitate and subsidise if necessary the use of the internet throughout the Province—ensuring no or low-cost access to the internet everywhere.
- The Government of Jiangsu should encourage enterprises in Jiangsu to participate actively in the setting of international technology and environmental standards.
- The Government of Jiangsu should protect and enforce intellectual property rights. In particular, it can try to centralise intellectual property rights litigation in a single court, say, in Nanjing, and its rulings should be binding over the entire Province. Moreover, its rulings should be made binding over the entire country if possible.

Policy Recommendations—Providing Tax Incentives

- Jiangsu should further enhance tax incentives for enterprises to invest in R&D. For example, Jiangsu already allows enterprises 150% deduction of R&D expenditures against their incomes but Singapore allows 400% deduction. Jiangsu can try to offer more. This will make it attractive for both domestic and foreign-invested enterprises to conduct R&D in Jiangsu and help raise the R&D expenditure to GDP ratio to 3.0%.
- Similarly, tax incentives similar to those for R&D can also be created for investment in goodwill and in brand-building.
- Even though China already has double-tax agreements with over 90 countries and regions, it does not have a double-tax agreement with Taiwan. Such a double-tax agreement will enable scientists and engineers from Taiwan to work in China and vice versa.
- Jiangsu can also explore the possibility of rebates to non-permanent academic visitors (for a year or more) to Jiangsu of any additional Chinese income taxes that they need to pay over and above their home country tax rates.

Policy Recommendations—Providing Tax Incentives

- Jiangsu can create and persuade the central government to grant tax incentives for private venture capital to finance start-ups. The success rate of venture capital is low, on the order of 10%. Investors of venture capital, whether natural or corporate persons, should be given the tax benefit of being able to deduct their realised losses against their other incomes—that is, to be given the opportunity to consolidate their incomes and losses from their economic activities in their tax returns. (R&D deductions are of no use to start-ups which fail since they have no income or profit.)
- Jiangsu can also create and persuade the central government to grant tax incentives for private donors to make donations to the leading universities in Jiangsu. This can take the form of deductions against personal or corporate income taxes, or in the form of matching grants from the Government of Jiangsu.

Creating and Maintaining an Innovation-Friendly Habitat

- What do Silicon Valley in California and Route 128 around Boston, two leading centres of innovation in the United States, have in common?
- Leading world-class research universities in the proximity
- Tax incentives for private venture capital
- A culture of innovation and open exchange of ideas (sharing, collaboration and cooperation)
- Protection and enforcement of intellectual property rights
- Maintaining free entry and competition in the high-technology sector (use of anti-trust laws)
- Toleration of failure and job-hopping and encouragement of collaboration (there is no (Not Made in Here (NMIH) syndrome)
- Attractive living environment—clean air, clean water, good primary and secondary schools, good transportation, un-congested roads and cultural and recreational facilities

Concluding Remarks

- Make the Province of Jiangsu the most hospitable to innovation and to investment in intangible capital!