H. M. Patel Memorial Lecture 2017

Climate Change, Uncertainty and Possible Ways Out

by

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Chancellor, Central University of Gujarat
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PG Department of Economics &
Agro-Economic Research Centre
H. M. Patel Institute of Rural Development
SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar 388120, Anand, Gujarat, India

February 2017

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Seating on dais - Dr. Mahesh Pathak (Hon Adviser, AERC) and Prof. Y. K. Alagh (Chancellor, Central University of Gujarat)

Felicitation of Prof. Y. K. Alagh by Dr. Mahesh Pathak & presentation of books by Prof. H.P Trivedi and Dr. S.S. Kalamkar to Prof. Y. K. Alagh

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About the Institute and Lecture:

As the Post-Graduate Department of Economics and the Agro-Economic Research Centre have been working in close collaboration for several decades, the Sardar Patel University has put them under the common umbrella of the H. M. Patel Institute of Rural Development in order to help them to work together which will be mutually beneficial to both of them. The H.M. Patel Memorial Lecture is instituted by the H. M. Patel Institute of Rural Development with the help of generous endowment grant given by Dr. Mahesh Pathak (Hon. Adviser, AERC).

About the PG Department of Economics:

The Sardar Patel University was established with a view to serve the cause of rural transformation. Hence, ever since its establishment in 1958, the PG Department of Economics has given rural bias to its teaching and research programmes. Recognizing the past record, the UGC also identified agriculture and rural development as thrust areas for the Department and awarded its Special Assistance Programmes for three consecutive phases of five years each. The Department also received Rs. 40 lakhs from the UGC under its ASIHSS (Assistance for strengthening Infrastructure in Humanities and Social Sciences) programme. During its long journey of more than five decades, apart from providing rigorous teaching at the Post Graduate level, the Department has prepared more than 100 project reports and guided 43 M. Phil and 50 Ph. D. students. Recently, UGC has recognized this Department as Centre of Advanced Studies (CAS) in Economics.

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Climate Change, Uncertainty and Possible Ways Out

Yoginder K. Alagh

Introduction

It is indeed a privilege to deliver the H. M. Patel Memorial Lecture. For me he was a very important person He was my mentor from the day I landed in Gujarat and even before that and played that role until the last day. I had a doctorate in Economics from the prestigious University of Pennsylvania and had taught at Wharton. I left a permanent position at the Indian Institute of Management at Calcutta to get back to Economics my great life long love. He was the Vice Chair and Karta Harta of the Governing Body of the Sardar Patel Institute of Economic and Social Research where I had accepted to be a Senior Professor

[1]The 4th H.M. Patel Memorial Lecture delivered at H.M. Patel Institute of Rural Development, Sardar Patel University, Vallabh Vidyanagar, on February 7, 2017. This lecture was jointly organized by the Post Graduate Department of Economics and Agro-Economic Research Centre (AERC) of Sardar Patel University, Vallabh Vidyanagar.

based on a one line appointment letter on an Inland letter signed by H.M.Patel. He was my boss and I used to kid him in long evenings at his home in Vidya Nagar that under the Fair Employment Practices Act I could draw my salary without doing any work because all the cards were in my favour.

When I got Patel Sahebs appointment letter on an Inland Letter, I was a 28 year old Chair of the Economics Group at The IIM Calcutta. I wrote to him asking him, what is the institute going to be all about. He said what is there to say? It will be a national institute in economics. I never asked anybody that question again for I knew what to do and he always backed me to the hilt. Together with Verghese Kurien and Vijay Vyas I was supposed to be one of his blue eyed boys. With him to back us we got going and in 1975 based on our work on Gujarat (the first State level planning model), the theory of industrialization (me, Kashyap and Subrahmanaian), textile labour (Papola and BB Patel)published in much quoted national and global literature, the Ministry of Education at Delhi gave us the status of a National Research Institute.

Patel Saheb had considerable interest in practical policies for a sustainable future and showed it in the meetings organised at Vidyanagar including here on Sardar Sarovar. I thought therefore that I would speak on Climate Change. This is by now a much vexed issue. President Trump is not too happy on it and his apathy goes beyond the difficulties large countries like India and China have on some schemes for amelioration and allocation of responsibilities. A few years ago I wrote a book on The Future of Indian Agriculture. The great historian, the Late Bipan Chandra when he found out that I was working on it insisted I publish it with the National Book Trust of which he was the Chairman. When I remonstrated that nobody reads the NBT, he said they priced books such that teachers and students could buy them. He was right since my book sold out and a reprint may be on the way. Thank you for buying it. When you do I get twenty rupees by way of royalty and it all adds up to my pension. As Keynes said never confuse margins with averages for a large number of small happenings can be more important than a small number of large ones, which is the logical basis of one's belief that a more equal society is preferable.

Large countries like India, China and the US don't live easily with shackles around their necks and so look dimly at restrictions. China burns more than two billion tonnes of coal and we are not even a third of that and yet it is the only fossil fuel we have in plenty. The US now has an Environment Protection Chief who ran a fossil fuel business. But in the Paris Climate Change meeting in the outskirts of Central Paris in the Le Bourget complex, the World over was running at a feverish pace but our country was somewhat laid back apart from an occasional official brief of an oft repeated stance from many earlier meetings, now suddenly changed without any indication of the quid quo pro. In the US for example there have been a set of meetings. In one of them, The Center for American Progress (CAP) and the World Wildlife Fund (WWF) and amongst others the Think Tank CAN, all close to the establishment, organised the Food Chain Reaction Game to simulate the consequences which would emerge as food security becomes a compelling requirement in the years and decades to come in the context of climate change. India has last month signed the Doha amendment to the Kyoto Protocol, four years later

by the second commitment period even though dated gives it the leeway to play a balancing role in the negotiations ahead.

I am a little bothered about climate change. It is obviously important for India in the not too distant future and one can almost smell it, as it were when I have my morning chai in the small garden my wife nurtures in our home. I have a feeling that it will have a determining impact in the not too distant future. But what is it in terms economists play with in their work; namely quantities and outcomes? Here we don't really know and the existing numerical models are I am afraid not too good. It is one of those things which is important and yet not predictable precisely. Given this state of affairs, can we help with the tools of economic analysis? I believe we can and will show with a small model of the agricultural economy to predict a Business As Usual Scenario and then make the sector struggle for its water and land as climate change dominates its growth path. This is needed since agriculture will have to struggle to get its water from rainfall, the rivers and the underground aquifers. When it does, but does not know the

detailed contours of what is happening, economic theory, particularly the technique of simulating 'Games' will help. I want to make a beginning, for younger scholars to take on the baton for the Alagh Law of Progress is that the next generation is smarter than mine.

Technology, Productivity and Growth

It was argued in the low capital formation phase of Indian agriculture that a gross rate of capital formation of about 12% of Agricultural GDP was necessary to support an agricultural growth rate of around 3.5% to 4% annual and this rate was not being achieved then. For example:

"It would be naïve to plan agricultural growth and policies with low incremental capital-output ratios (ICORs). In terms of gross capital formation, past ICORs are estimated as follows:

Period	**ICOR**
1978/79 to 1986/87	4.37
1987/88 to 1991/92	3.32

Agricultural gross fixed investment is around two thirds of agricultural gross investment. It would be imprudent plan for an ICOR of less than 3 for agricultural fixed capital formation." (Y. K. Alagh, 1997, p.283).

These kinds of investment levels have been consistently exceeded, but the agricultural growth rate does not show the resilience that a twenty percent capital formation would provide. This in turn raises in a fundamental way questions of productivity of investment and non renewable resource constraints of land and water. Real resource scarcities remained. Cropped area, earlier a constant, was falling whilst the area under irrigation was a matter of concern. There was recognition that faster diversification of the sector was required to achieve growth objectives, and this required policies relating to market reform and infrastructure in the context of the rural urban continuum (Y. K. Alagh, 2013). Since widespread growth was required, a policy of "walking on two legs" was needed with improved productivity of cereal producing areas allowing land to be released for high value crops. In the short run, technology

and input intensification were seen as the source of growth as policies of land and water management take effect. But to some public sector agricultural research was not a priority. The Planning Commission for example in the Mid Term Appraisal of the Eleventh Plan pointed out the strategic nature of seed research but ravished the ICAR and said that only a reliance on the private sector would be required to meet the technology gaps. (GOI, 2010, pp.66/67). This was a mistake.

Technology is going to be the kingpin of solutions. The high rate of capital formation in Indian agriculture which had reached 21 percent of agricultural GDP is not leading to a commensurate increase in agricultural growth. Groups pushing technology should be in the drivers seats and that should be a hot seat with performance markers. Since the land base has stopped growing, productivity growth will have to be much higher. The present author, worked out that the past growth of productivity in agriculture was 1.62 % annual in the decade 1981-90 and 1.55 % annual in the decade 1991-2000. This growth would have to be 1.72 to 2.08% annual in the period 2001-2020 if agriculture grows at roughly

3.5 to 4% annual and 1.9 to 2.5% annual if agriculture grows at 3.8 to 4.8% annual in the period 01-20. Thus to source higher growth factor productivity will have to rise at least by a third, which is difficult in agriculture. While we had developed these estimates in 2002/05 (Y.K.Alagh, 2006), it was heartening that the Approach Paper to the Twelfth Plan stated that a third of agricultural growth was to be sourced from technology in the following words 'Technology is the main prime mover of productivity in agriculture where natural resources are fixed. Studies have shown that at least one third of the future growth in productivity should come through innovations in crop technologies (GOI,2011,p.93: For a more detailed discussion of this see Yoginder K. Alagh, 2006, 2013).

All this is good. But planning has been abolished and it would be useful (more realistic?) to start with a Business As Usual Scenario. This could be around the following contours:

Employment Scenario: 2020

-BAU-

	India 2020
Total Population (million)	1273
Rural Population (million)	738
Labour participation rate %	46
Labour Force (million)	340
GDP growth (% annual)	8.5
GDP agricultural growth (% annual)	3%
Employment elasticity w.r..t..	-0.3%
Agricultural growth (Low)	
Land augmentation through	
Increase in cropping intensity	0.1%
Increase in cropping intensity	0.0 to 0.03%

With the trend rate of growth of agriculture, a low elasticity of employment growth, real wages will not rise much and there will be few changes in the structure of the labor force. In fact in this kind of an economy It has been worked out numerically that the growth process itself will come to a halt. (See, Kanchana Chopra, and B. Golder, 2001, Table 2.6). If on top of this we add on Climate Change and that means that water availability goes down, either by rainfall failure or by floods, we are in serious trouble. The moral here is not the numbers. It is the lesson that existence is at peril if we carry on as we are. Georgescu Rogen has this chilling description of the entropy of the system and a matter of fact description of' The Second Law of Thermodynamics, called also the Entropy Law'. Has an irreversible decline already begun? (N.Georgescue Rogen, 1966, p. 67 and Ch.5).

This is much too sad a story for a generally optimistic kind of blighter that I am. So lets skip the last para and get back to a story where society develops the tools to understand its problems and makes an effort to solve them. In a seminar in Washington, it was said that nothing ever succeeds

in India and the chair a mischievous old man like me turned to me and said 'Yoginder, what do you have to say? I piped back saying that 'It is correct to say that nothing ever succeeds in India but nothing ever also fails in India.' So as we muddle along, we will make progress, not spectacularly but never go back. Policy will work for the fact that in the next decade, Indian agriculture will meet the requirements of food security and rapidly diversify itself. It will function in a rural urban continuum, with rapid developments of markets and shifting of working populations from villages to linked small towns and also from crop production to value added activities. Employment growth will be high in these activities chasing a high rate of economic growth. All this will happen if the institutional structure gives the appropriate signals in term of technology and organizational support and the necessary economic support in terms of pricing and infrastructure support. Otherwise there will be rising food prices chasing few goods and immiserisation.

Agriculture will grow at 4% annual, technological change and diversification will be

high so the shift away from agricultural on this account will be 20% over the decade. (Elasticity of employment -0.3%). This will mean a corresponding increase in real wages of the agricultural labor force. This benign process will be in the following larger frame work.

India 2020

Total Population (million)	1273
Rural Population (million)	738
Labour participation rate %	46
Labour Force (million)	340
GDP growth (% annual)	8.5
GDP agricultural growth (% annual)	4%
Employment elasticity w.r.t.	
Agricultural growth (High)	-0.1%
Land augmentation through	
Increase in cropping intensity	0.5%
Increase in cropping intensity	0.2%

(Source: Y. K. Alagh, 2013).

In a benign framework of development, agriculture will grow at 4% annual, technological

change and diversification will be high so the shift away from agricultural on this account will be 20% over the decade 2010-2020 (Elasticity of -0.3%). This will mean a corresponding increase in real wages of the agricultural labour force.

Institutional reform of markets, empowerment of small farmers to leverage their assets for strategic partnerships with corporates, new technology and market linkages and the establishment of farmer groups and local institutions to build up the support bases for emerging Indian agriculture will all be needed and advocated by us and the strategic nature of agricultural research will not be lost sight of. The only other factor which will affect outcomes in this logical framework is the augmentation of the land base of Indian agriculture. If land augmentation emerges again with success of the interrelated issues of land and water management, cropping intensity can rise by 0.5% annual and real wages would rise by 7% additional or 27% in the total and rural-urban inequality would go down. The poorest Indian getting richer by around a third is surely worth aiming at. What will climate change do?

Games as Bargaining Tool Under Uncertainty

Getting back to The Food Chain Reaction Game (Para 2 of this lecture),the founder of the Center for American Progress addressed the participants of the Game towards the close of their deliberations and he later was the Adviser to the US delegation at the Paris meet. His successor and its present President, the American of Indian origin Meera Tanden is seen on Indian TV screens elaborating US views on complex issues. The setting of a 'Game' to discuss this issue was itself fascinating. Game theory is all about reactions of different players (stakeholders?) to assumed actions by other 'players'. To simulate the 'Game' is an interesting way of analysing the 'futures' or possibilities in an uncertain field.

Conventionally this would be done in voluminous academic tomes, at the end of which the uncertainty remains. A Game on the other hand forces the analysts to be specific to the extent possible in an uncertain world.

The context was set up by Large countries, India, China, Brazil, big blocks, the USA and the

European Union, Continental Africa, the Multilaterals and other groups including business investors and the media. They were stimulated to play their role in the unfolding food security policies in the context of the global trade regime. The first recognition was that the food security problem was not just in grains but in commodities like sugar, oil, animal husbandry products, vegetables and fruits and in a sense, the problem was more complex than that foreseen in the last three decades of the last century. The switch away from grain took place at around $3000 per capita in 1990 purchasing power parity prices. The question really was the derivation of policy such that distortions in agricultural trade regimes could be removed and incentives for the producers established such that a farmer would then take the maximum advantage of his resource endowments of land, water and soil, access to technology and produce the agricultural commodity which goes into the food security in a globally efficient manner. This was then seen as generating sufficient income including for very small peasants and the wages of landless labourers. The obstruction in achieving these goals were listed

and different exercises were stimulated to play their role in removing such obstruction in other ways and through policies. This would obviously involve collaborative games between countries. If crops cultivated were globally competitive, this exercise would very soon develop an exciting realistic paradigms and given the professional commitment of the groups involved, almost realistic processes of communication and tradeoffs.

The question really then could be seen as showing a positive outcome that emerged from such cooperation of different actors facing a complex problem and in that context pushing them out of short term zero sum policy stances. The organisers of the game would come out with their detailed profile of the exercise and its outcomes. But the mechanism itself should be of interest in a country where shortages of irrigated land and water are increasingly anticipated. When I was asked to arbitrate the Cauvery dispute, the most important strategy for me was to get the actors from the Garden areas in Karnataka down to the Delta of the Kavery in Tamil Nadu to see how the resolution of the dispute could be around better ways of using water. That would involve cooperation and I

remember, Kannada Prabha Front paging a picture on the front page with my hand on a young man's shoulder. He said, we wanted to separate from you and I responded , you cannot because I will not separate from you. He said, I cannot continue injustice to which my reply was let us fight it together. We devised a three tier system (See the contemporary significance of this Business Line, 12 September 2016) which was earlier tried in the Mekong where countries which had gone to war with each other cooperated in a plan providing the minimum flow of water to the downstream Tonal Sap in the monsoon where the requirements of half a million persons had to be protected and this required changes going up stream all the way. The Asian peasant is the product of a millennium of history and if policy is honest then s(h)e will respond..

The Asian Context

Large Asian countries have detailed agro climatic inventories (For Indonesia see L. Nasution 1993 and I Aziz, 2000, for India see Y. K. Alagh, et. al., 1988, for China, Kunmin, Z. and He Xueyang, 2000, for summary of China, Indonesia,

and India, UNU, 2002). It is a fascinating scientific story but suffice it to say that the large Asian land masses, the Indonesian Archipelago, the countries of what was called Indo-China, Thailand and Myanmar and South Asia are rich in agro-climatic diversity and are what I have called in UNCEDs Sustainable Development: From Concept to Action Project, 'World's within the World' (Y. K. Alagh and I Sachs in UNCED, 1991). This in fact becomes a very powerful argument for trade. What it says is that for each region we should look for what it can do best. Agriculture and rural development would then concentrate on specialization and food and fibre deficits and surpluses would be cleared with trade. I have shown that agricultural growth based on agro climatic resource endowments is sustainable in the sense that it is water, energy and land conserving. Climate Change Policy Games have to be visualized in this context to make sense in Asia. We attempt to list some of the important issues this will entail.

My argument is that Climate Change should be studied in this context and the need to help the different resource endowment World's as a part of

specialization around their endowments. The policy issues would be an assessment of diversification processes as a part of rebalancing in terms of consumption and demand trends and possible change in the structure of the labor force in fast growing Asian economies; The marketing, communication, first stage processing infrastructure and knowledge and skill basis of accelerating the process and avoiding angularities and dislocation of unanticipated sharp shifts, as seen in political conflicts in countries like India and China for example in land acquisition and lack of facilities for migrants in rural urban continuums. The climate Change issue will have to be placed in the rurban context. Again there will be the unequal development paradigm within countries. This will not only be for the Large Asian countries like China, Japan, Pakistan and India, but also for countries like Viet Nam, Thailand and the Phillipines. Viet Nam for example has very different sub economies in the Valleys and Deltas and in the Highlands (See Son, et.al., 2006). These would have trade and/or exchange policies, including tariffs and incentives for smooth functioning of markets in a medium term

framework, rather than the impacts of volatile markets in fledgling developments needing medium term stability. This in turn would need development of financial products and markets to support the market processes at play, in diverse capital markets. There would be the need of safety nets including employment guarantees and food security networks. Asian economies have reached a stage where advances are possible and security can provide powerful incentives for technological change, as in earlier periods of economic history;

Development of interregional profiles would give a larger context in which such policies can be followed. It is true that most of the rebalancing literature, particularly of the CGEM GTAP variety gets dominated by US and Germany outcomes. Recognizing the importance of large global economies, it is possible that exploration of comparative static Asian interregional flows will throw up interesting alternative possibilities. The macro frameworks accepted at the Seoul meetings of the ADB could provide quantitative coordinating framework in which such possibilities could be explored. Counterfactuals

where structural change of the kind discussed takes place in a benign framework as also BAU projections exist, to highlight the importance policies can make.

Conclusion

The challenges facing us are severe. Whenever policy responded to needs, the Indian farmer was not found wanting. It is obvious that a lot of work is needed to operationalise the incentives to turn terms of trade towards agriculture and to plan and implement the required infrastructure support, as well as integrated water and land resources management. Resources are unfortunately scarce. One of the most distressing news of the collapse in the macro economy in 2014/15 is the decline of Gross Investment as a ratio of GDP in last year to 29% from the figure of 32% three years ago and 34% earlier. We have to make efforts to get out of this trap.

Climate Change Games can be played in Asia. They must recognize the resource endowment differences and the labour context of the Asian economies.

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Chancellor, Central University of Gujarat
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