ECONOMIC AND SOCIAL DIVERSITY IN AUSTRALIA'S COTTON-PRODUCING COMMUNITIES

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Abstract
Economic and Social Diversity in Australia's Cotton-producing Communities
Australia's highly profitable cotton industry is geographically constrained to districts in northern New South Wales and Southern Queensland. However, the rural towns servicing the industry are facing unprecedented stress on account of fierce commercial competition between them, many years of drought during the 2000s, technological innovation in cotton production, the chance occurrence of non-agricultural economic opportunities, and even ethnic composition. Our research focuses on the role of innovative small business in overcoming community stress and we have selected a small sample of six local government areas to examine this link in depth. The selection of a representative sample entailed the classification of cotton communities on the basis of their economic and social profiles and how they had evolved over the inter-census period 2001-06. This analysis surprisingly showed that cotton growing regions are highly differentiated not just at a single point in time (2006), but also in their development trajectories. This considerably complicated the process of sample selection, but also demonstrated the diversity of rural settlement.

Key words
diversity of rural settlements, non-agricultural activity, cotton industry, innovative SME's

1. Introduction

The authors are currently working on economic and social prognoses for Australia's cotton producing communities and how their commercial and community leaders might best tackle the task of securing their futures, especially through the use of innovative business management techniques[1] (Kotey, Sorensen and Reavell 2009). Our starting point was a detailed analysis of economic and social conditions in cotton communities as portrayed by 2006 census data and changes occurring over the five years since the previous census. We expected to find a small number of community types and that these would be evolving sedately between the two censuses in question. The conditions discovered confounded such expectations and revealed great heterogeneity in both current conditions and local economic and social evolution for the study localities over the 5 years since the previous 2001 census. This exploratory work helped to improve our understanding of spatial variations in economy and society among cotton producing local government areas (LGAs), prior to selecting a representative sample of LGAs where we could investigate the behaviours of innovative small businesses in considerable detail.

Our purpose here is to sketch briefly the geography of Australia's cotton industry and to both describe and explain current socio-economic conditions in cotton communities. A brief final section explores the implications of such variable conditions both for public policy in general and attempts by local businesses to secure their community's future. It is also obvious that some localities are more sustainable than others in the long run, and we canvass reasons why.

2. On the Cotton Industry

Cotton is a major Australian crop produced within a limited range shown in Fig. 1, mostly in the Murray Darling Basin (MDB) system – an area twice the size of France and roughly 2000km N-S and 1000 km E-W. The industry developed during the 1960s in the Gwydir and Namoi river catchments of Northern New South Wales[2], operated by a few large corporations like Auscott. These locations are still the heartland of cotton production, as shown in Fig. 2. Since then, the industry has prospered and expanded geographically across the MDB and has become notable for its global price and quality competitiveness and 98% export orientation. These achievements depend on intensive research and development: genetic modification (pesticide resistance, lower water up-take, fibre quality); ecological sustainability; nutrient needs; optimal tillage regimes and the use of precision agriculture, among others. This large scale and high quality production provides growers with high returns on capital, despite expensive outlays on (a) laser levelling of fields, (b) irrigation storage and distribution works, (c) specialist cotton harvesters (all picking is mechanical), and (d) modern ginning facilities to remove impurities and produce pure cotton lint. Ninety-five percent of farms, for example, plant transgenic cotton, and it is easily Australia's most profitable crop.

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[1] This work is funded by a large grant from Australia's Cotton Catchment Communities. Cooperative Research Centre based in Narrabri, NSW, Australia.

[2] http://www.freeessays.cc/db/41/sff255.shtml [Brief history of Australian cotton industry accessed 28.09.09].
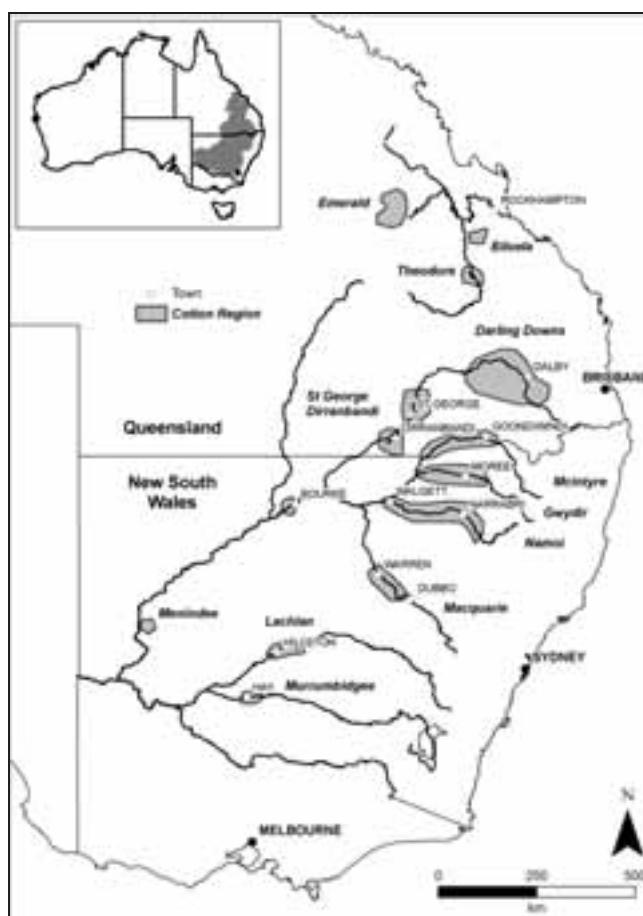
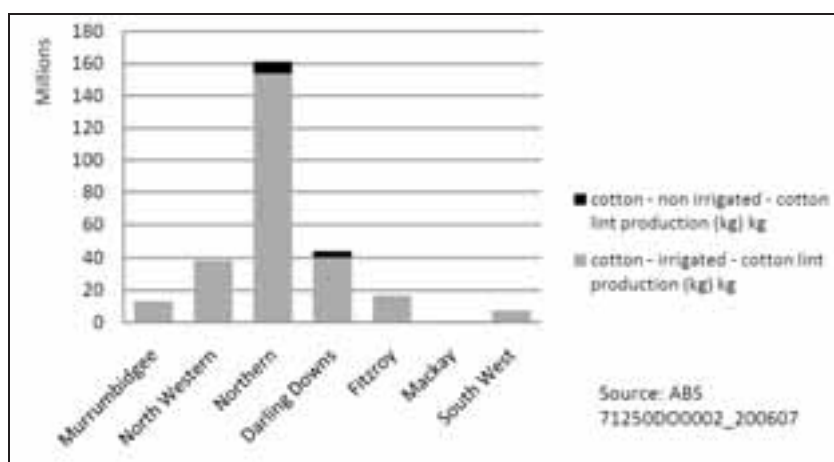Fig. 1: The Spatial Distribution of Cotton Production.

Fig.2: Regional variations in Lint Production 2006-2007.

The crop is to some extent a high risk one. Its export orientation exposes producer income to fluctuating cotton prices, severe exchange rate movements, and producer subsidies in competing nations (e.g. up to US$240,000 per farm in the United states). The crop is about 90% irrigated and most of the water comes from vast inland storage dams holding run-off from the headwaters of the Murray-Darling river system. On-farm capture of intermittent stream flows, as at Cubby Station on the Balonne River system near St George in southern Queensland, augments the major dams. Additional water comes from groundwater reserves, especially on the Condamine River near Dalby. Groundwater is a more reliable source of irrigation water than surface flows for the time being, but is subject to over-extraction and depletion. Dependence on irrigation is, then, a second regional development nightmare, especially when the MDB has just been through a maybe 1 in 100 year drought. It has lasted 7 years in southern growing areas and, although less elsewhere, it greatly depressed output. There were some signs of recovery in the northern MDB catchments of the Namoi, Gwydir, McIntyre, Condamine and Balonne systems after good rains from late 2008 onwards. Fig. 3 shows the volatility of production in recent years arising from drought.
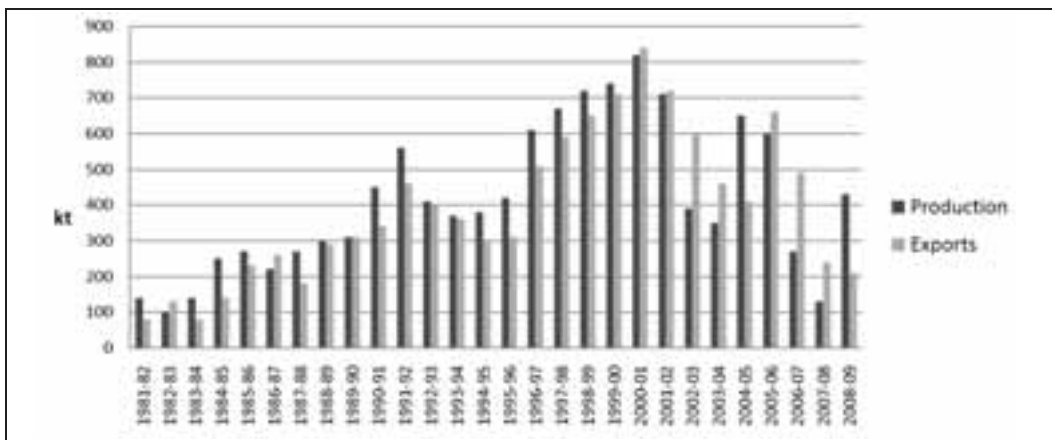

Fig. 3: Variable Production and Export

Volatile production makes for some interesting producer – community dynamics. The well-being of most Australian rural towns, which lie well beyond the commuting range of large cities, is dependent on agricultural profitability and consequent farmer outlays on both production and consumption goods. Long droughts, like the current 7 year drought in southern NSW and northern Victoria, are therefore a major stressor for small towns because storages tend to empty quickly, curtailing agricultural production for extensive periods[3]. However, there are some mitigating conditions. Cotton is so profitable that farmers can live off the income from a single good season for up to three years. Other less water intensive crops such as wheat, canola, and lucerne for fodder can sometimes substitute successfully in a drier year.

While this helps farmers, it is less use to cotton dependent service businesses, which (a) engage in such production-related activities as picking and ginning,

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[3] See http://www.mdba.gov.au/water/waterinstorage and http://en.wikipedia.org/wiki/Murray-Darling_Basin

spraying and top dressing, and transport; or (b) the supply of capital items like pumps, fencing, on-farm water storages, handling facilities, and laser levelling. Without employment and income, often highly skilled service workers quickly migrate elsewhere, leading to circular and cumulative job and population losses. In Australia's case, migration opportunities have been plentiful during one of the greatest mining booms of all time, which fuelled large shortages of all kinds of skilled labour. Indeed, Australia avoided technical recession during the current global financial crisis, is now growing strongly, and unemployment reached only 5.7%. History has shown that rural workers are often mobile in both directions, so they could flood back to agriculture after several good production years under normal seasonal conditions.

3. Socio-Economic Conditions in Cotton Communities

These dynamics may well affect each cotton dependent community in different ways, according to their rainfall conditions, farm investment and production strategies, the local importance of cotton production, regional opportunity sets, business management skills, and the socio-economic complexion of rural residents. In 2006, cotton's share of the value of regional agricultural production was 24% in Northern NSW, about 10% in northwest NSW, the Darling Downs and SW Queensland, and lower elsewhere. Some rural towns have better opportunities than others in tourism, downstream processing of agricultural produce, mining, accessibility to growing places and their spill-over effects, quality lifestyles or cultural and historical associations. They also have different capacities to realise opportunities through quality leadership, strategic capacity, and entrepreneurial ability.

On the down-side places face a variety of potential threats specific to their circumstances. For example, Aboriginal populations typically have low education skills and income and places with large Aboriginal populations may be handicapped in retaining services. Some places are also much more dependent on irrigation water than others or perhaps less able to husband available supplies. They may therefore suffer greater swings in economic fortune, exacerbated where government buy-backs of irrigation licences occur. At Bourke in northern NSW, a major local agricultural producer (Tourale Station) sold its water entitlements to the government, and it has been estimated that the Bourke economy could lose 10% of its trade. The MDB Authority is also tightening water regulation concerning ground water extraction and harvesting surface flows by individual farmers.

On top of these, the normal adjustment processes of rural settlements will occur, favouring the growth of larger, better located, and more resource rich communities (Sorensen 1990). Strong evidence points to the high profitability of large farm enterprises, leading to rapid consolidation of holdings and accelerated rural depopulation. However, larger agricultural producers often have different purchasing behaviours compared with small ones, tending to favour larger service centres. Finally, the well-being of rural communities is often age-related since older people tend to have lower disposable incomes and different spatial perceptions to the younger set. Thus, social and economic conditions will vary between places both at a single moment in time and over the course of a few years.

Fig. 4 hypothetically demonstrates a variety of possible population and service trajectories over a 10 year period for different types of cotton-producing community

facing a major shock (with year zero = 100). That shock is often drought, but could also be disease, a slump in commodity prices, or a drastic change in such public policy settings as water entitlements or the introduction of carbon emissions trading. Settlement type A, which includes regional service centres on major transport routes, has broadly based economies which are often reasonably insulated from system shocks. Type B places suffer large cyclical gyrations in production and population for the reasons given, but usually recover. Types C and D suffer permanent damage of differing severity according to quality of both local resources and human (especially business) and social capital.
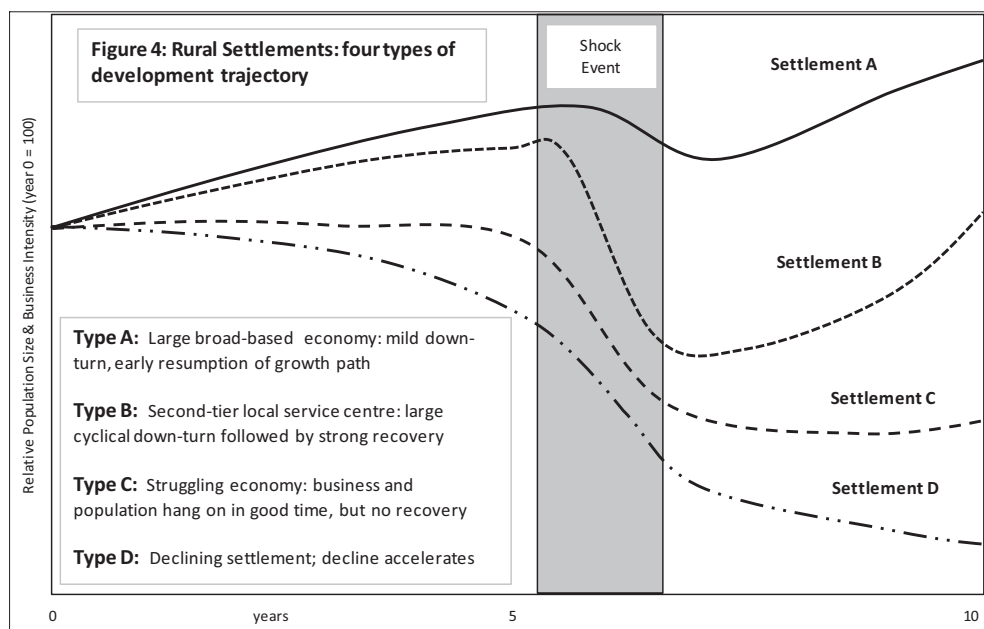

Fig.4: Rural Settlements: Four types of development trajectory.

We explored some of these issues via census data – of the types listed in Tab. 1 – for all 19 local government areas (LGAs) hosting cotton production in 2006 and 2001. Such data omit important information on several crucial issues for place well-being, including social capital, quality of institutions, leadership and entrepreneurship, infrastructure, the cost and availability of finance capital, and environmental resources. Nevertheless, the census data reveal many important aspects of place and how they are changing over time. Two separate data sets, each of about 50 socio-economic variables, were constructed, providing (1) a 2006 statistical snapshot and (2) a picture of changes occurring between 2001 and 2006. Where necessary, data were standardised to percentage, ratio values or deviations from the mean to enable ready structural comparison between LGAs irrespective of population size. Because of a high level of autocorrelation between variables, each data set in turn was subjected to a principal components analysis to create a small number of statistically significant composite descriptors. This resulted in 9 synthetic variables with Eigenvalues >1.0 for 2006 data and 13 synthetic variables for the 2001-06 change data. The computed component scores on each synthetic variable for all 19 LGAs were then subjected to cluster analysis using the Ward method. Two separate runs classified LGAs on the 2006 and 2001-06 change data. The Ward

procedure progressively groups observations (here LGAs) with like profiles across the synthetic variables and maximises their separation from other groups in 9 (or 13) dimensional space. The iterative grouping process progressively loses information as clusters form and grouping ceases when statistically significant information loss occurs. The merits of this specific method are discussed in depth by Sorensen and Weinand (1991).

Tab.1 : Selected variables.

	Variable Types (2006 Data) 49 Separate Items Selected	Variable Types (2001-06 Change Data): All 49 (2006) Variables, plus extra items shown (=52)
Demographic Structure	Age Structure (5 age cohorts)	
	Gender Balance (M/F)	Separate Change in M & F
	Indigenous Proportion	Plus Change in Indigenous Population
	Median Age	
Income & Housing Expenditure	Median Individual and Household Incomes	
	Family Income Structure (6 income bands)	
	Median Housing Loan Repayments	
	Housing Loan Repayment Structure (4 bands)	
	Median Rent Paid	
	Rental Payments Structure (4 bands)	
Housing and Households	Median Household Size	
	Household Structure (3 categories)	
	Dwelling Type (3 categories)	
	Structure of Housing Occupance (3 categories)	
Work and Education	Unemployment Rate	Plus Change in Workforce Size
	Labour Force Participation Rate	
	Full- (part-) time Share	
	Share of Population with (a) Degree (b) Other Tertiary	
	Industrial Structure (4 categories)	
	Occupational Structure (3 categories)	

We were surprised by the outcome revealed in Tab. 2, which plots cluster memberships in 2006 against those arising from the change data. Remember, the clusters shown are those reached when information loss became great. The large number of single member clusters, for both dates, and the small sizes multi-members clusters mean that the socio-economic characteristics of cotton LGAs in 2006 were highly diverse and that the changes occurring within them over the 5 years to 2006 also differed substantially. Moreover a comparison of cluster membership between the two dates shown in Tab. 2 reveals few similarities. In one small instance, Hay, Narrabri and Warren had very similar socio-economic

conditions and change trajectories because they appear in the same cell in Tab. 2. However, their change patterns over 2001-06 were also similar to three other places (Goondiwindi, Dalby and Balonne) which were in other clusters in the 2006 analysis. Likewise, Gwydir and Wambo shared similar features with Hay, Narrabri and Warren in 2006, but belonged to another cluster according to their change data (see Fig. 1 for many of these locations).

Tab.2: Cluster Membership: 2006 data x 2001-06 data.

		2001-06								
		1	2	3	4	5	6	7	8	9
2006	1	Balonne Dalby	Bourke Murrumbidgee					Moree Plains		
	2	Goondiw indi		Murilla						
	3		Banana				Emerald			
	4	Hay Narrabri Warren		Gw ydir Wambo						
	5					Bauhinia				
	6				Chinchilla					
	7				Walgett					
	8								Narromine	
	9									Waggamba

Source: Computed by the authors.

Such heterogeneity means that many of the towns whose businesses we were studying encountered very different operating conditions, even before we added in the vagaries of social and human capital, local resources, or the significance of cotton production in the agricultural sector. We had to select just six towns for in-depth investigation of the roles and operations of innovative businesses in dispensing of producer and consumer services under uncertain conditions, but this had just become a difficult task. We may hypothesise that business conditions will be very different in all these places because of their diverse geographical environments and likely response mechanisms by businesses, residents and governments alike to adverse consequences of all kinds. This is important because the cultures of innovative businesses are likely to be shaped partly by their operating environments and partly by their managers' and indeed staff skills, knowledge, creativity and imagination, and focus.

Having selected these communities, the second stage of our project was to visit each of them for familiarisation with all the economic, social, political, institutional and environmental issues we have flagged. Such visits also aimed to identify innovative business that appeared to be operating successfully in high-risk environments. These will be the focus of the project's third stage when we will explore how small business operators work to secure their future viability. We anticipate finding many common approaches and strategies irrespective of locational circumstance. Equally, we expect personal traits and place characteristics will, in some degree, uniquely colour business management techniques, thereby increasing our understanding of the relative importance of spatial and behavioural issues in shaping rural regional economies. The businesses selected had to demonstrate an ability to ride out the roller coaster cycle of agricultural conditions and shifting small

town viability in a fiercely competitive market place. Note also that Australian federal and state governments provide very little support for any of the actors in this game compared with international standards. In fact, governments' financial contributions to gross non-metropolitan product, whether in the form of regional policy or farm support, have been calculated at c. 0.4% annually, a trivial amount (Hearfield and Sorensen 2009, Sorensen 2009).

4. Discussion

This project is timely because Australian agriculture and cotton in particular, face many unprecedented difficulties, which will test alike both community resilience and business adaptation. We have already noted the difficulties and changes imposed by:

- drought
- fluctuating international commodity prices (modified by fluctuating exchange rates)
- galloping new production technologies
- market-driven consolidation of farm holdings, leading *inter alia* to a long-term average annual decline in farm population of 1.5% (Sorensen, 2009)
- the rise and fall of different settlement types
- ever changing transport and service delivery settings
- changing government environmental regulations, and
- widespread lack of government financial support for rural communities.

These are complexly interlinked and, with exception of environmental regulation, largely market driven. Indeed Australia is ranked third out of 175 countries on the Heritage Foundation's scale of economic freedom after Hong Kong and Singapore[4]. The survival and resilience of communities operating in Adam Smith's laboratory depends largely on local effort: the strategies and tactics of small business and the quality of community leadership. Many geographical studies focus on the latter, but now it is time to examine the former, which appear to be central to the sustainability of place.

Furthermore, the pace of change in market systems is accelerating, whether in rural or urban settings. Whereas Europe and parts of north Asia are particularly bound up with defence of traditions, Australia has few traditions and those are readily set aside as a mobile society's attachment to place is relatively thin and new opportunities elsewhere are eagerly sought. This raises the interesting perspective that sustainable businesses and communities have to be far-seeing, imaginative and highly adaptive rather than backward regarding. So one element of our study entails formal scenario construction over a 10 year time horizon to get a feel for what might happen to cotton communities. We will then ask our business respondents about their expectations about their operating environments and assess their degree of foresight against the scenarios constructed. Our *a priori* expectation is that effective businessmen, judged by past and present performance, will also have strong and accurate future orientation. Given that their behaviours will be moulded partially by their operating environment, this will suggest a degree of community foresight and ability to adjust to changing conditions as they emerge.

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[4]   See http://www.heritage.org/index/topten.aspx for a list of the top 10.

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ECONOMIC AND SOCIAL DIVERSITY IN AUSTRALIA'S COTTON-PRODUCING COMMUNITIES
Summary

I am currently working on economic and social prognoses for Australia's cotton producing communities and how their commercial and community leaders might best of about the task of securing their futures. A starting point for this project entailed detailed analysis of economic and social conditions in cotton communities portrayed by data from the the 2006 census and changes apparent from the comparable census five years earlier. I expected to find a small number of community types and that these would be evolving sedately between the two censuses in question. The conditions discovered confounded such expecations and revealed massive heterogeneity in both current conditions and local economic and social evolution for those localities engaged in cotton production.

This paper starts by sketching the geography of Australia's cotton production and the criteria for the selection of cotton communities studied. It then presents briefly the methods and results of the statistical appraisal. Thirdly, it explains the diversity of economic and social circumstance found. A fourth and final section explores the implications of such variable conditions both for public policy in general and attempts by local actors to secure their community's future. In this respect, it is obvious that some localities are rather more sustainable than others in the long run. Furthermore, it is possible to diagnose the factors apparently contributing significantly to sustained community viability. This, in turn, raises important questions about latent stress points as those factors potentially evolve in hostile directions.