The economic rationale for funding honeybee research

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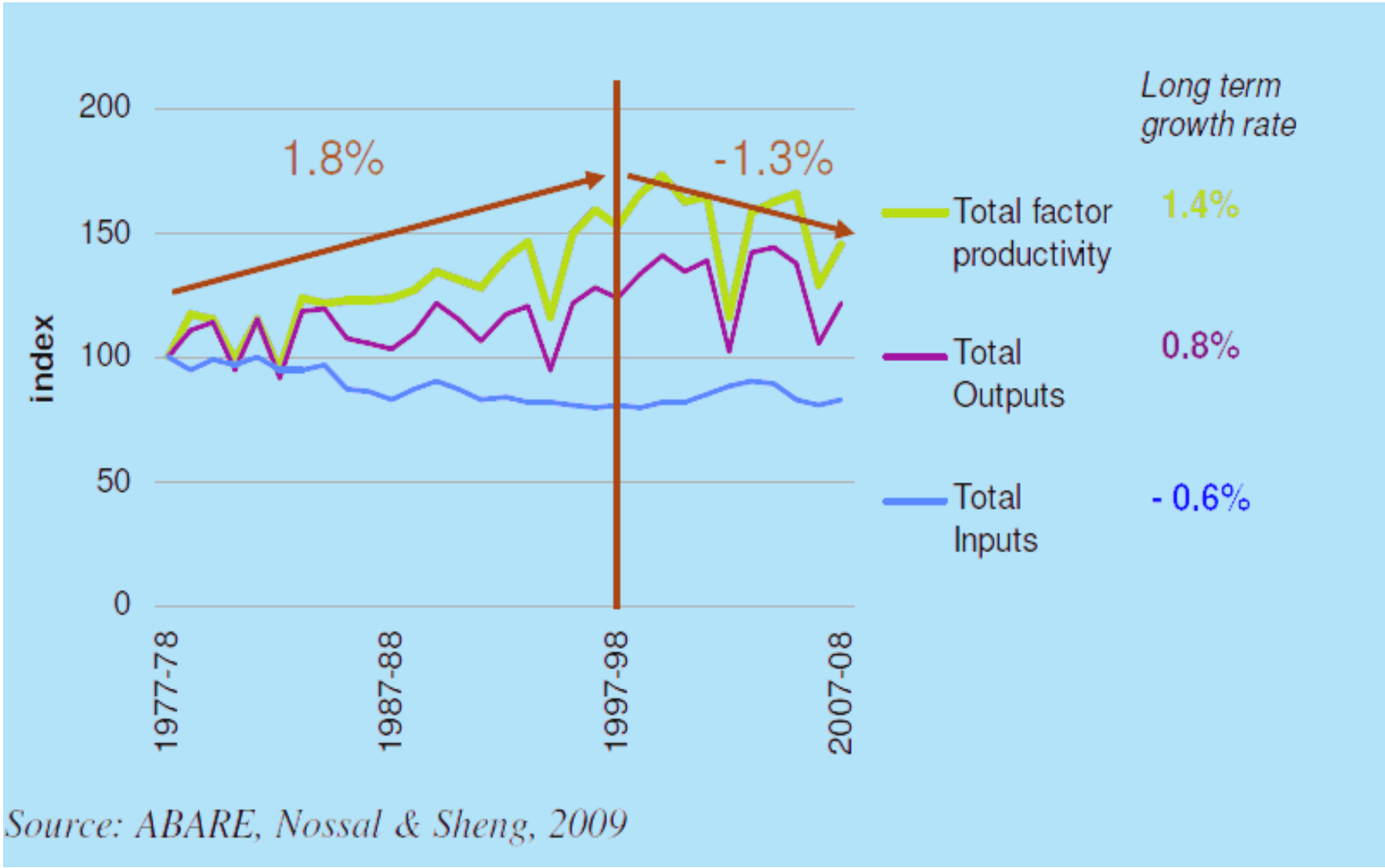
Australia

Productivity trends for the Australian agricultural sector



Source: ABARE, Nossal & Sheng, 2009

International agricultural productivity

- A meta- study by Alston et al on worldwide agricultural productivity trends found that there was evidence of a significant pervasive slowdown in agricultural productivity growth since 1990 or thereabouts and in their analysis similar patterns emerged using various measures
- **Commodity prices**
- **Crop yields**
- **Production per unit of land or labor**
- **Multifactor productivity studies**

Annual Agricultural Productivity requirements to 2050

	Productivity growth 1961-63 to 2005-07
Soybeans	1.60
Barley	1.21
Sorghum	0.92
Millet	0.90
Seed cotton	1.72
Rape seed	2.43
Groundnuts	1.26
Sunflower	0.58

Annual Agricultural Productivity requirements to 2050

	Productivity growth 1961-63 to 2005-07	base case
Soybeans	1.60	1.05
Barley	1.21	0.64
Sorghum	0.92	1.18
Millet	0.90	1.14
Seed cotton	1.72	0.81
Rape seed	2.43	1.32
Groundnuts	1.26	0.55
Sunflower	0.58	0.64

Annual Agricultural Productivity requirements to 2050

	Productivity growth 1961-63 to 2005-07	base case	land constant
Soybeans	1.60	1.05	1.93
Barley	1.21	0.64	0.69
Sorghum	0.92	1.18	1.33
Millet	0.90	1.14	0.80
Seed cotton	1.72	0.81	0.55
Rape seed	2.43	1.32	1.69
Groundnuts	1.26	0.55	1.63
Sunflower	0.58	0.64	1.38

Annual Agricultural Productivity requirements to 2050

	Productivity growth 1961-63 to 2005-07	base case	land constant	land -5%
Soybeans	1.60	1.05	1.93	2.05
Barley	1.21	0.64	0.69	0.81
Sorghum	0.92	1.18	1.33	1.45
Millet	0.90	1.14	0.80	0.91
Seed cotton	1.72	0.81	0.55	0.67
Rape seed	2.43	1.32	1.69	1.80
Groundnuts	1.26	0.55	1.63	1.75
Sunflower	0.58	0.64	1.38	1.50

The Productivity Debate

- The agricultural productivity improvement decline debate is not over yet.
- If true, the alternative is greater intensification in production.
- More fertilisers, more chemicals to feed the growing demand.
- Economic signals that the market thinks there will be greater intensification
- The takeover bid for Potash Corporation of Saskatchewan
- The most limited in supply source of the major fertilisers
- Expecting rising demand with consequent higher production and higher prices
- A clear signal from the market for intensification

Global pollinator crisis? No?

- Ghazoul does not think there is one
- "It is possible that a global pollination crisis is… in progress, but I do not believe that evidence for such a crisis is currently strong."
- "dependence of modern agriculture on honeybees for pollination is at the heart of the pollination crisis , diversifying the suite of crop pollinating species has been proposed as an appropriate management response"
- "many non- Apis species are potential candidates for providing pollinator services"
- "Natural or semi-natural habitat remnants provide nesting sites and reliable food sources"

Global pollinator crisis? Unknown?

- Aizen and Harder
- "Regrettably, despite increasing claims of global pollinator declines , the data needed to assess global changes in the abundance and diversity of wild pollinators are not currently available."
- "This disproportionate increase in global human consumption of high-value crops accompanied both globalization in food trade and the adoption of market policies …we propose that human trade and economic policies, rather than need, have created demand for increased cultivation of pollinator- dependent crops and pollinator dependency of global agricultural production. "

Table : Honeybee colonies required for pollination (selected crops)- post varroa in Australia

Crop	Area	Hives per ha	Pollination hives required
Almond	27314	3	81,942
Apple	12258	3	36,774
Apricot	1408	2	2,816
Avocado	6392	3	19,176
Cherries	3670	2.5	9,175
Cucumber	8661	2.5	21,653
Macadamia	14864	5	74,320
Mango	7613	8	60,904
Nectarine	2938	2	5,876
Peach	2879	2	5,758
Plum & Prune	3176	2	6,352
Total			328,486

Table: Potential pollination requirements broadacre agriculture - Australia

Crop	Area	Hives per ha	Pollination hives required
Canola	971400	0.5	485,700
Cotton	327194	0.6	196,316
Faba beans	130000	2	260,000
Lupins	500000	5	2,500,000
Soybean	23819	4	95,276
Sunflower	77515	4	310,060
Total			3,847,352

Table : Honeybee colonies for pollination - pre and post varroa (existing producers)

Hive Numbers	Beekeeper numbers	Average number of hives	Total Hives	Post Varroa hive numbers
250-500	340	320	108,800	54,400
500-1000	264	632	166,848	83,424
1000+	74	1592	117,808	58,904
Total	678		393,456	196,728

Hive requirements – pollination dependent crops

Product	2009	Hives per ha	Hives required
Almonds	1,796,475	3	5,389,425
Apples	4,922,034	3	14,766,102
Avocados	436,280	3	1,308,840
Cherries	381,482	3	1,144,446
Cucumbers	1,958,000	4	7,832,000
Mangoes	5,092,802	8	40,742,416
Peaches	1,568,447	2	3,136,894
Pears	1,580,876	2.5	3,952,190
Plums	2,534,873	2	5,069,746
			84,566,593

Hive requirements – broadacre crops

Commodity	2009	Hives per ha	Pollination hives required
Lupins	687,416	5	3,437,080
Rapeseed	31,120,565	0.5	15,560,283
Seed cotton	30,430,889	0.6	18,258,533
Soybeans	99,501,101	4	398,004,404
Sunflower seed	23,716,835	4	94,867,340
			530,127,640

Indicative hive requirements

	World	Australia
Pollination hives required - minimum for selected dependent crops	84.6	0.33
Pollination hives required - potential for broadacre crops	530.1	3.85
Currently available	28.4	0.39
Post varroa		0.2

Consequences of a reduction in productivity improvements

- Demand will continue to increase because of population and economic growth
- With reduced productivity improvements, supply can only increase from intensification of existing technologies
- Greater chemical and fertiliser use with reduced fallow periods
- Less insect pollination available from unmanaged sources
- Managed pollination demand will increase for
- -- maintaining or increasing yield of existing crops
- -- integrated into chemical spray cycles to ensure survivability and workability
- -- all managed pollination sources will be subject to similar management regimes

Policy options

- First best, continue the research and development to improve overall agricultural crop productivity
- Second, take out an insurance policy of ensuring existing technologies can be scaled up to meet the food production challenge
- Part of this insurance policy will be ensuring the infrastructure is available for scaling up pollination requirements
- Who should pay?
- The honeybee industry is too small to fund the research
- Who benefits?
- Pollination dependent agriculture
- Consumers
- How do we get them to pay?
- The economics are straightforward, the politics are hard