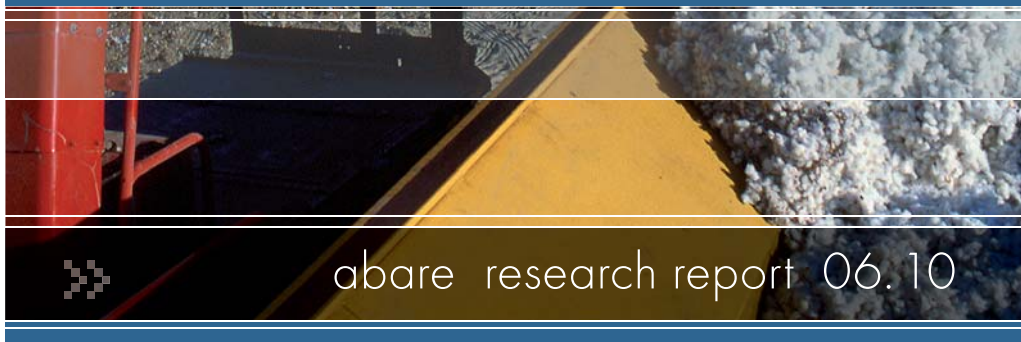


US AGRICULTURE without farm support



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don gunasekera and brian s. fisher

september 2006

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foreword

Agriculture in the United States has experienced substantial structural change throughout the twentieth century and these changes are likely to continue. Such changes are likely to be influenced by many factors, including farm policy developments in the United States and elsewhere.

The provisions of the 2002 US farm bill are due to expire in 2007, and so consideration of replacement legislation is under way in the United States. Farm policy reform and industry adjustment in the United States do not mean that all previously supported agricultural sectors will disappear. Rather, reforming US farm policy would lead to improvements in agricultural productivity and generate medium to long term benefits for the lightly supported and unsupported agricultural sectors and the economy as a whole.

In this report, the prospects for US farm policy reform in the presence of multilateral trade reform are analysed to highlight the medium to long term benefits, and associated net budget savings, to the United States.



BRIAN S. FISHER
Executive Director

September 2006

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summary

- > Despite general perceptions, nearly two-thirds of US agriculture receives no farm program commodity payments. Further, 93 per cent of US farm support accrues to producers of five crops (corn, cotton, wheat, rice and soybeans) that collectively contribute only 21 per cent of total cash receipts in agriculture. In addition, around 56 per cent of farm support accrues to commercial farms that account for only about 17 per cent of the total number of US producers that receive farm support.
- > With the 2002 US farm bill due to expire in 2007, consideration of replacement legislation is under way in the United States. Implementing meaningful reforms will be vital to the future growth prospects of the US farm sector and the economy more generally. In the medium to long term, the lightly supported and unsupported agricultural industries are expected to be major beneficiaries of US farm policy reform.
- > Exposure to market signals and increased competition can lead to positive industry adjustment and facilitate the development of a well functioning agriculture sector. This is evident in many countries that have experienced domestic policy reforms and have undergone structural adjustment. Farm policy reform and industry adjustment experiences in Australia and New Zealand may provide some useful insight into the future policy reform direction for the US farm sector.
- > Farm policy reform and associated industry adjustment does not mean that all previously supported agricultural industries will disappear in the United States. US farm policy reform would, over time, lead to improvements in agricultural productivity as a result of an increase in the average farm size, better allocation of resources and an improvement in the average efficiency of farmers. For example, the deregulation of the New Zealand farm sector in 1984, and the subsequent industry restructuring, has resulted in an average growth rate of 2.5 per cent a year in total factor productivity in agriculture in the post-1984 period, compared with 1.5 per cent a year in the pre-1984 period.
- > Several illustrative reform scenarios – including analysing the prospects for US farm support reform in the presence of multilateral trade reform – are examined in this report using ABARE's global trade and environment model (GTEM).
- > The analysis indicates that reforming US farm policy would have medium to long term benefits for the economy as a whole. If US farm policy reform were

complemented by more market oriented multilateral agricultural trade reform, it is expected that the adjustment costs associated with domestic farm policy reform in the US agriculture sector would be lower and there would be enhanced market access gains for US agricultural exporters.

- > If US farm support reform were complemented by more market oriented multilateral agricultural trade reform, the analysis undertaken in this report indicates that the production of wheat, beef and fruit and vegetables would expand in the medium to long term, relative to what would otherwise have been the case. On the other hand, highly supported industries, such as sugar and cotton, are likely to contract in the medium to long term, relative to what would otherwise have occurred.
- > There are likely to be considerable US budget savings associated with US farm policy reform that is complemented by more market oriented multilateral trade reform. Such potential budget savings (in net present value terms) are estimated to be around US\$120 billion (in 2005 dollars) over the period 2007-20, than would otherwise have been the case. The estimated net present value of the change in US agricultural gross incomes, during the same period, would be an increase of US\$7 billion (in 2005 dollars) over what would otherwise be the case.
- > One implication of this is that agricultural producers could be provided with fully decoupled adjustment assistance that would maintain agricultural gross income at existing levels and there would be considerable budget savings in net present value terms. In Australia, for example, the industry adjustment program used in the dairy industry deregulation process included measures such as one-off tax free payments to exit the dairy industry, for producers who were unable to adjust and maintain their profitability.
- > Changes in patterns of production, following agricultural policy reform, are likely to affect the viability and profitability of some farmers. The challenge for policy makers is to ensure that the benefits of farm policy reform are sufficiently widely shared so that a consensus for welfare enhancing change can be obtained. One way is to help farmers who are likely to leave the agriculture sector to get the necessary adjustment assistance to take advantage of new opportunities. Building such a consensus may be far from easy. However, the effort is well worth making, as the potential benefits are considerable.

introduction

US food and farm policy is largely determined every five to seven years through legislation that is commonly referred to as the 'farm bill'. Each new farm bill provides the policy settings for a specified period. Hence, in the leadup to the extension of each farm bill, debate intensifies on the nature of the provisions and policy settings to be included in the new bill. The provisions of the *Farm Security and Rural Investment Act 2002* (the legislated outcome of the 2002 US farm bill) are due to expire in September 2007, and hence discussion of replacement legislation is now under way.

Each farm bill sets down policy parameters and guidelines for a wide range of government measures. These include farm support programs, domestic food assistance, trade measures, foreign food aid, export credits, rural development, crop insurance, conservation and research and extension. The farm program provisions of the farm bill determine the nature and level of support provided to US agriculture.

One of the key elements of farm bill assistance is support to farmers. The main avenues through which support is provided include a combination of minimum prices, government payments to ensure farmers receive a minimum return and direct payments to farmers.

With debate currently occurring on the nature of future farm legislation in the United States, the focus in this report is on the medium to long term potential impacts of reforming US farm policy. Particular emphasis is placed on examining the potential implications of removing high levels of farm support from those in receipt of it on the lightly supported and unsupported agricultural activities.

farm support in the farm bill

Government assistance to food and agriculture in the United States is provided in a variety of ways, including expenditure on domestic food and nutrition programs and farm support programs (figure A; Office of Management and Budget 2006).

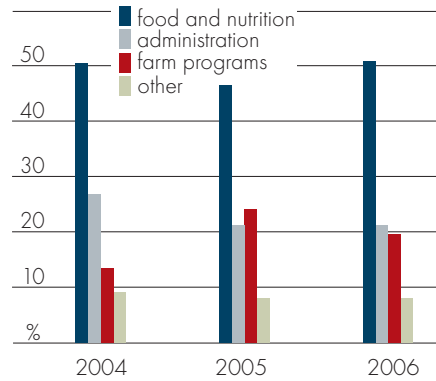
The main agricultural commodities covered by the farm support provisions of the farm bill include farm 'program crops' (wheat, rice, feed grains, cotton and soybeans) and import competing commodities, including sugar and dairy products. Importantly, a number of significant US agricultural industries either do not

receive support through the farm bill or are lightly supported. These industries include beef, pig meat, poultry, fruit and vegetables.

Despite general perceptions, nearly two-thirds of US agriculture receives no farm program commodity payments (Thompson 2005). Further, 93 per cent of US farm support accrues to producers of five crops (corn, cotton, wheat, rice and soybeans) that collectively contribute only 21 per cent of total cash receipts in agriculture. In addition, around 56 per cent of farm support accrues to commercial farms that account for only about 17 per cent of the total number of US producers that receive farm support (Johanns 2006).

Support mechanisms in the United States have differed for program crops and import competing commodities. Program crops have been supported mainly through budget payments (see appendix A). US producers of grains, oilseeds and cotton receive government support primarily through three programs – fixed direct payments, countercyclical payments, and marketing loan support (also known as deficiency payments). Sugar and dairy products have been supported mainly through import barriers that maintain domestic prices well above world prices (see appendix B). Support for dairy prices has also been reinforced by export subsidies.

figA shares in US Department of Agriculture budget outlays



2

changes in US agriculture

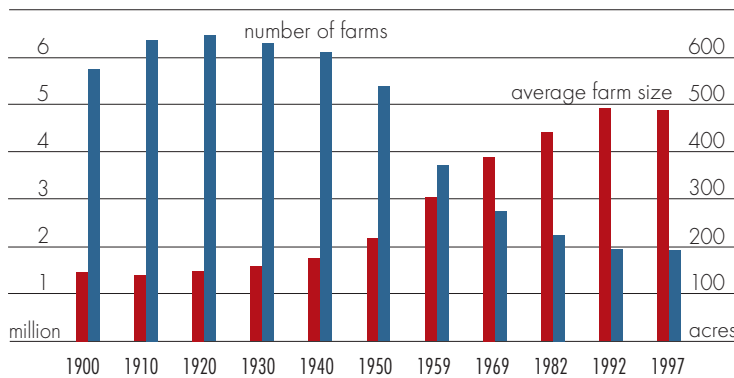
While US farm support is intended to raise the incomes of some farmers, such support can hamper the performance of the rest of US agriculture. Support payments encourage operators to overuse capital, land and labor in supported activities that would otherwise have been used in activities that would have generated higher returns in the absence of support. This subsequently leads to changes in a range of farm sector attributes, such as farm numbers, farm size, land and rental rates, farm incomes and income from off-farm employment. These impacts are discussed below.

farm numbers and farm size

farm numbers have declined and farm size has increased

Over the twentieth century, farm numbers declined and average farm size increased in the United States – as shown in figure B (NASS 2002).

fig B **average farm size and number of farms in the United States**



farms more specialised, producing fewer commodities per farm

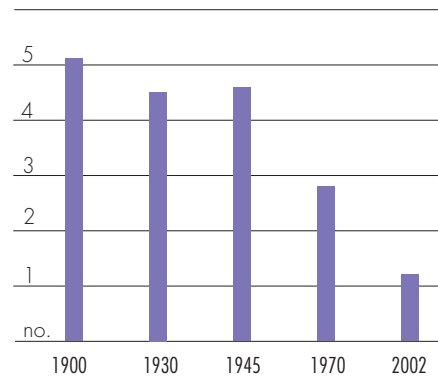
Farms in the United States have become more specialised, with each farm producing fewer commodities (figure C; NASS 2002; Gardner 2002). There has also been a change in agricultural production away from traditional agricultural products to higher value added products, including fruit and vegetables, processed food products, dairy and nursery and greenhouse products (Whitton 2004).

These traditional products include food grains and feed grains, tobacco and cotton – products that have received support from the US government for many decades.

pressure for higher cost farmers to exit the sector

When farmers leave the sector, farm amalgamation has occurred. Apart from age and health reasons, a major factor in people's decision to leave farming has been the inability to make a sufficient income. These pressures are continuing today, with the farmers most likely to make the decision to leave farming being those who are the least profitable. In general, operators with less education, who are older or who are managing smaller farms are more likely to be making losses (Foreman and Livezey 2002; Brooks 2001).

fig C **commodities produced per farm in the United States**

***farm incomes, labor and off-farm work***

In the 1930s, when farm programs were first instituted, per person farm income was only a third of the average income of the remaining population. At that time, around 21 per cent of the workforce was employed in agriculture and around half of farm households were below the poverty level (Offutt and Gundersen 2005).

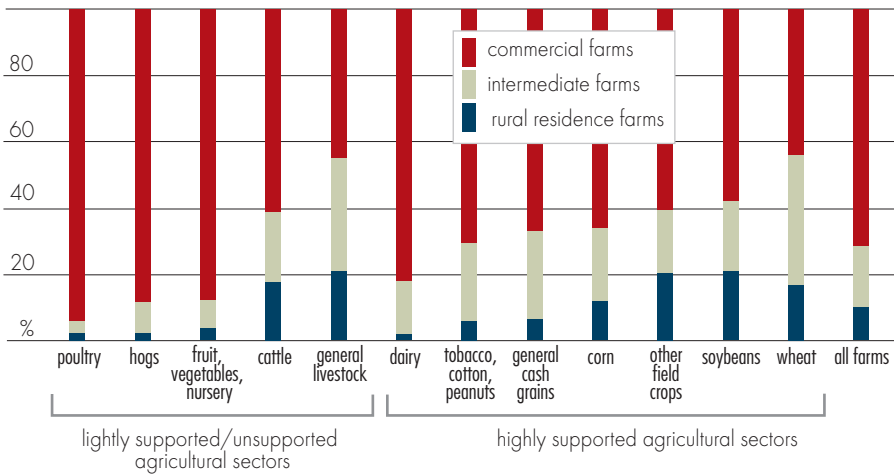
average farm household income now tends to exceed that of the average US household

Today, however, the average farm household tends to be better off than the average American household. In 2004, average farm household income exceeded that of the average US household by about 35 per cent (Economic

Report of the President 2006). The median wealth of farm households (around US\$460 000) was five times the median wealth of all US households in 2004, reflecting the large amount of money tied up in farm assets, primarily land (Covey et al. 2005). Currently, around 2 per cent of the US workforce is employed in agriculture and farm poverty is at all time low levels (Dimitri et al. 2005 and Offutt and Gundersen 2005).

The rural landscape in the United States may appear to be dominated by a large number of small scale rural residence farms, but it is the small number of large-scale farms that account for the bulk of food and fibre production. In 2004, the 10 per cent of farms listed as commercial enterprises accounted for 71 per cent of total gross farm cash income, while at the other end of the spectrum, the 65 per cent of farms listed as rural residences contributed only 10 per cent of total gross farm cash income (figure D; ERS 2006a).

fig D **shares in total US gross farm cash income, by farm type, 2004**
including government payments



Not all farms receive government payments. In 2004, only 39 per cent of US farms received government payments. Government payments accounted for about 20 per cent of net farm cash income across all farms in 2004. The importance of government payments to net farm cash income also differed greatly across different sized farms. On rural residence farms, net farm cash income was actually negative, as cash expenses exceeded cash income (including government

payments) (see box 1 for definitions of farm types). These losses would have been three times as large were it not for government payments. Government payments provided 36 per cent of net farm cash income on intermediate farms and 13 per cent on commercial farms (ERS 2006a).

declining trend in agricultural labor force

Over the past century, with the decline in farm numbers, the number of workers in US agriculture has also fallen (figure E; NASS 2002). This trend reflects growth

box 1: definitions of US farm types for 2004

commercial farms

large family farms – sales between \$250 000 and \$499 999.

very large family farms – sales of \$500 000 or more.

nonfamily farms – farms organised as nonfamily corporations or cooperatives, as well as farms operated by hired managers.

intermediate farms

Small family farms whose operators report farming as their major occupation.

low sales farms – sales less than US\$100 000.

high sales farms – sales between US\$100 000 and US\$249 999.

rural residence farms

Farms with sales less than US\$250 000.

limited resource farms – small farms with sales less than US\$102 400 in 2004 and low operator household income – that is, less than the poverty level for a family of four in both 2004 and 2003, or less than half the county median household income in both years. Operators may report any major occupation except hired manager.

retirement farms – small farms whose operators report that they are retired.

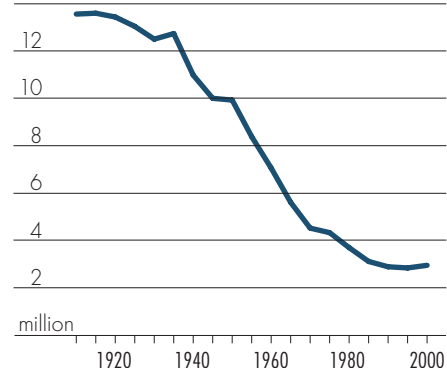
residential/lifestyle farms – small farms whose operators report a major occupation other than farming.

Source: ERS (2005a)

in agricultural productivity that has permitted a smaller rural labor force to produce a rising level of farm output (Economic Report of the President 2006).

While the United States is one of the largest agricultural producers in the world, agriculture is only a small sector in the US economy. As indicated earlier, agriculture accounts for around 2 per cent of the US labor force. The agricultural labor force in the United States reached a peak of approximately 13.5 million in 1910 and declined to around 3 million in 2000.

fig E **jobs in crop and livestock production in the United States**



Over the twentieth century, the growth in the labor force in the United States lagged that of capital, more so in agriculture as mechanisation became a growing imperative for successful farming. Mechanisation led to labor-augmenting technical change that was associated with declining demand for labor in agriculture. The resulting occupational migration of labor out of agriculture to other sectors – and farm labor seeking off-farm work to supplement income from farming – facilitated the rapid growth of the other sectors and contributed to a faster rise of labor productivity in the economy. This is because the labor that was released from agriculture had to acquire specific skills in other sectors. Mechanisation and improvements in labor saving technology also had the effect of accelerating US agricultural production (Mundelak 2005).

table 1 **farm numbers in the United States, by value of annual sales, 2002**

increasing trend in off-farm employment

Relatively strong growth in other sectors of the US economy has increased farm household income from sources other than farming and has made rural areas less dependent on the overall contribution of agriculture to the rural economy.

As indicated earlier, agricultural production in the United States has become

	farms '000	share %
value of annual sales per farm		
Under US\$ 10 000	1 263	59
US\$ 10 000–49 000	414	20
US\$ 50 000–99 000	140	7
US\$ 100 000–499 000	241	11
Over US\$ 500 000	71	3
All farms	2 129	100

Source: NASS (2002).

concentrated on a small number of farms. The number of farms in the United States declined from a peak of approximately 6 million farms in 1935 to an estimated 2.1 million farms in 2002. Of the 2.1 million farms, around 80 per cent of the total had annual sales of less than US\$50 000 in recent years (table 1).

As noted in box 1, US government statistics disaggregate farms into three broad types: commercial farms; intermediate farms; and rural residence farms (ERS 2005a). These three types of farms all earned more than the annual average US household income in 2004 (figure F; ERS 2005b). Rural residence and intermediate type farms are reliant on income from off-farm sources, while commercial farms earn more from farming.

On average, farms with annual sales less than US\$50 000 earned negative income from farming, even though they earned more from nonagricultural sources than the median income of the US household. For farms in this annual sales category, income from farming activities is unlikely to support a household, and losses from farming must be offset by substantial off-farm income (Thompson 2005). In addition, the contribution of government payments to total farm household income has been minor relative to income derived from diversification into off-farm employment (ERS 2005b). This is true for other types of farms as well (table 2).

Even though government payments can provide a supplement to net farm cash income, the great majority of US farmers, especially small operators, rely heavily on off-farm employment to stay in agriculture. With off-farm employment as the primary occupation for operators of rural residence farms, it is no surprise that they earned significantly more from off-farm sources than operators of intermediate or commercial farms.

fig F **average annual farm operator household income in the United States, by farm type, 2004**

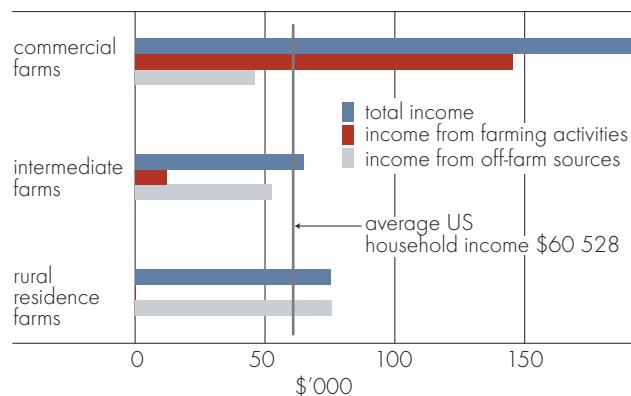


table 2 **average annual income of US farm operator households, by farm type, 2004 ^a**

	income source			
	farming activities	off-farm sources	combined income	government payments
	US\$	US\$	US\$	US\$
Commercial farms				
Large	79 516	44 870	124 386	25 444
Very large	223 791	47 434	271 225	43 945
Intermediate farms				
Farming occupation				
- lower sales	4 804	58 119	62 923	2 637
- higher sales	34 319	36 011	70 330	13 335
Rural residential farms				
Limited resources	-5 946	13 648	7 702	1 084
Retirement	4 136	58 418	62 554	1 577
Lifestyle or residential	-381	96 879	96 498	1 180
All farm types	13 884	65 776	79 659	4 855

^a See box 1 for definitions of farm types.

Source: Based on ERS (2006a).

Risks associated with uncertainties of weather and crop yields, changes in government policies and developments in global markets can cause income from farming to be more variable than income from off-farm sources. Devoting time to off-farm work gives farm households an option to manage and absorb such risk and volatility in order to reduce or stabilise the adverse financial effects of uncertainties (Economic Report of the President 2006). On the other hand, government price and income support programs appear to be blunt instruments for reducing risk (US Department of Agriculture 2006a).

limited effect on farm household income

It has been argued that government commodity payments reduced the amount of off-farm labor supplied by farm households in the United States (Ahearn, Yee and Huffman 2002). In analysing the relationships among productivity, structure and government farm payments for the period 1960–96, Ahearn et al. (2002) have shown that government commodity payments increased the value of the farmers' time allocated to working on the farm, relative to the off-farm wage rate. Further-

more, they argued that off-farm employment is likely to be less than it would be in the absence of farm programs.

These trends in farm labor and off-farm work in US agriculture imply that moving away from government commodity payments would have a much smaller effect on total farm household income in the future. This is because, for farms that are reliant on an off-farm occupation to make up a substantial proportion of total farm household income, growth in off-farm employment opportunities and off-farm wages may be as important as farm support (ERS 2005b).

The removal of government commodity payments would prompt households that were unable to adjust and maintain their profitability to leave farming and enter

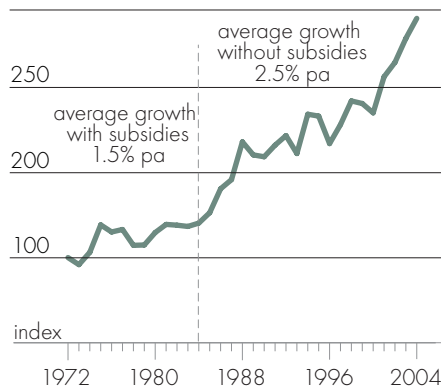
box 2: New Zealand agriculture before and after subsidy removal

Policy reform in New Zealand since 1984 has had a significant impact on the agriculture sector, with a lifting in overall total factor productivity (see figure TFP; ABARE and MAF 2006).

The two major outcomes of the agricultural reforms were productivity growth in individual sectors (for example, dairy, beef, sheep) and resource reallocation to high productivity sectors. The deregulation in 1984 and the industry restructuring afterward have led to a competitive market structure that is free of distortion and allows for a better response to market signals. As a result, resources are more efficiently used, and changes in export mix reflect the changes in the diversity of markets and products.

Total factor productivity

New Zealand



ABARE and MAF (2006)

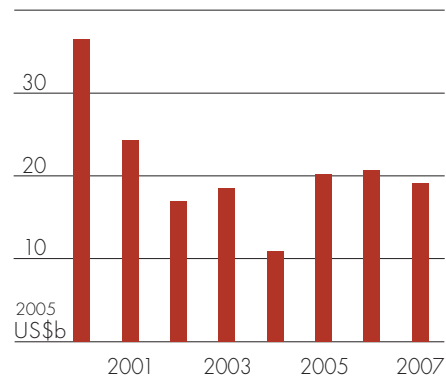
either the non-farm economy or previously unsupported and lightly supported agricultural sectors. Farm industry adjustment, however, does not mean that all previously supported agricultural sectors will disappear. Rather, exposure to market signals and competition can lead to positive industry adjustment, including a lift in overall total factor productivity (see box 2 for New Zealand's experience).

That is, the removal of government commodity payments that have inhibited the long run reallocation of labor to nonagricultural sectors and unsupported or lightly supported agriculture would lead to the development of well functioning agricultural sectors that benefit US agriculture and the economy more generally.

impact of removing farm support

The US farm sector receives substantial levels of domestic support, averaging around US\$20 billion (in 2005 dollars) a year since 2000 (figure G; ERS 2006c). Reform of US farm support policies could invoke changes in the US agricultural sector such as changes in the size and number of farms, as well as the mix of agricultural enterprises. However, it is important to note that US farm programs are an inefficient instrument for providing income support to farmers. In addition, a large proportion of farm support seems to be going to farmers that account for a small share of total agricultural production in the United States. Hence, in the absence of farm support, the agricultural sector would not be expected to contract by the full value of withdrawn support.

fig G **total US farm support**



There are also likely to be economic welfare gains for the economy as a whole from farm support reform. For instance, taxpayers including consumers would be likely to benefit if market price support schemes were removed. Land values would be likely to fall and new entrants into farming, or those wishing to expand their operations, would also benefit.

quantifying the impacts of structural change stemming from cuts to farm support

ABARE's global trade and environment model (GTEM) is used to illustrate the potential structural changes and impact on farm incomes from reforming US agricultural support. GTEM is a dynamic computable general equilibrium model of the world economy. GTEM is based on the GTAP version 6 database. It captures

intersectoral effects and links regions through trade and investment, making it a suitable tool to analyse the effect of improved market access and a reduction in domestic support. Detailed information on GTEM is available on ABARE's web site (www.abareconomics.com).

GTEM is used to analyse three scenarios.

scenario 1 – an illustrative simulation where the United States is assumed to abolish domestic support for US agricultural producers and eliminate all import tariffs on agricultural products.

scenarios 2 and 3 – these combine scenario 1 with two illustrative multilateral agricultural trade liberalisation simulations – a 'less market oriented' approach and a 'more market oriented' approach.

At present, it is not clear when the Doha Round of multilateral trade negotiations will resume. Hence, any analysis of possible multilateral trade reform outcomes are illustrative only.

The only available information that may provide some broad insights into the range of respective positions of key members of the WTO is the negotiating proposals that have been put on the table during the Doha Round since October 2005 (see box 3). Given this background, the two illustrative multilateral trade simulations – based on the underlying key elements (such as the tariff and domestic support reduction approaches, tariff caps and the treatment of sensitive products) of the negotiating proposals tabled during the Doha Round – considered here include a 'less market oriented' case and a 'more market oriented' case (see box 4).

Hence, the second scenario combines the first scenario, with other countries reforming their farm policies in line with an illustrative 'less market oriented' multilateral trade simulation.

The third scenario combines the first scenario, with other countries reforming their farm policies in line with an illustrative 'more market oriented' multilateral trade simulation.

Scenarios 2 and 3 are analysed and compared with the illustrative scenario 1.

In both the second and third scenarios it is expected that the potential adjustment costs associated with US farm support reform would be reduced if US reforms were undertaken at the same time as other countries reformed their farm support policies. This is because efficient US agricultural sectors would expand as market

box 3: key elements of the US, EU and G20 negotiating proposals*market access***United States**

Bound tariff cuts of 55–90% (maximum cuts where bound tariffs are over 60%)

Tariffs capped at 75% for developed countries

1% of total agricultural tariff lines can be nominated as ‘sensitive products’

European Union

Bound tariff cuts of 35–60% (maximum cuts where bound tariffs are over 90%)

Tariffs capped at 100% for developed countries

8% of total agricultural tariff lines can be nominated as ‘sensitive products’

A ‘pivot’ allows the flexibility to take cuts smaller than 35% on many lower-range tariffs

G20

Bound tariff cuts of 45–75% (maximum cuts where bound tariffs are over 75%)

Tariffs capped at 100% for developed countries

*domestic support***United States**

Cuts to overall trade distorting domestic support of 75% in the first band, 53% in the second band, and 31% in the third band

Cuts to AMS of 83% in the first band, 60% in the second band, and 37% in the third band

‘Blue box’ capped at 2.5% of the total value of agricultural production

Reduce *de minimis* support by 50%

European Union

Cuts to overall trade distorting domestic support of 70% in the first band, 60% in the second band, and 50% in the third band

Cuts to AMS of 70% in the first band, 60% in the second band, and 50% in the third band

‘Blue box’ capped at 5% of the total value of agricultural production

Reduce *de minimis* support by 80%

G20

Cuts to overall trade distorting domestic support of 80% in the first band, 75% in the second band, and 70% in the third band

Cuts to AMS of 80% in the first band, 70% in the second band, and 60% in the third band

Note: Given that agreement was reached on the elimination of export subsidies at the Hong Kong Ministerial meeting, elements of the proposals relating to export subsidies are not reported here.

Sources: European Commission (2005); ICTSD (2005); USTR (2005).

box 4: key assumptions in multilateral trade liberalisation scenarios*market access***Less market oriented case**

(part of scenario 2)

Bound tariff cuts of 20%, 30%, 35% and 40% in four bands: 0–30%, 30–60%, 60–90%, and 90% and over (maximum cuts where bound tariffs are over 90%)

No tariff caps for developed countries and developing countries

8% of total agricultural tariff lines nominated as ‘sensitive products’

Reduction commitments by developed countries will be phased in over five years

Tariff cuts for developing countries will be two-thirds of the cuts required by developed countries; reduction commitments by developing countries will be phased in over ten years

More market oriented case

(part of scenario 3)

Bound tariff cuts of 65%, 75%, 85% and 90% in 4 bands: 0–20, 20–40, 40–60 and 60 and over (maximum cuts where bound tariffs are over 60%)

Bound tariffs capped at 75% for developed countries and 100% for developing countries

1% of total agricultural tariff lines nominated as ‘sensitive products’

Reduction commitments by developed countries will be phased in over five years

Tariff cuts for developing countries will be two-thirds of the cuts required by developed countries; reduction commitments by developing countries will be phased in over ten years.

*domestic support***Less market oriented case**

(part of scenario 2)

Cuts to overall trade distorting domestic support of 70% in the first band, 50% in the second band, and 30% in the third band

More market oriented case

(part of scenario 3)

Cuts to overall trade distorting domestic support of 80% in the first band, 75% in the second band, and 70% in the third band

*export subsidies***Less market oriented case**

(part of scenario 2)

Eliminate export subsidies by 2013

More market oriented case

(part of scenario 3)

Eliminate export subsidies by 2013

access opportunities expanded. To determine the effects of the simulated reforms, results from all three individual scenarios are compared with a reference case where current policies are maintained.

scenario 1 – US farm support reform

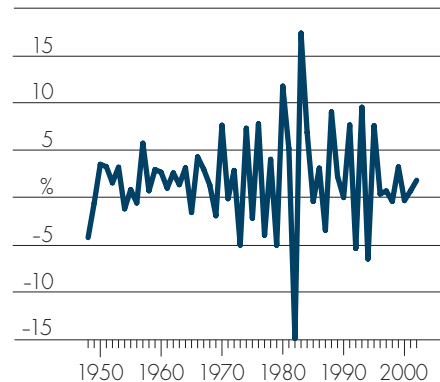
In this scenario, it is assumed that reform of US domestic farm support is a gradual process and that cuts to support are phased in evenly over ten years from 2007 to 2016 inclusively. In this scenario, all distorting forms of domestic support – output, input and land based subsidies – are completely eliminated by 2016. Additionally, market price support provided through the operation of import tariffs is removed, with tariffs phased out by 2016.

The removal of support could, over time, lead to improvements in productivity as a result of increasing farm sizes as well as an improvement in the average efficiency of farmers as the less efficient farmers leave the industry. To account for this, it was assumed that the removal of farm support would lead to some structural adjustments in the previously protected farm sector, culminating in better allocation of resources and an increase in the productivity of the US agriculture sector. While all agricultural activities are likely to benefit from increased economies of size, technical efficiency improvements are likely to be particularly concentrated in the previously supported activities.

Between 1948 and 2002 the average growth in total factor productivity in US agriculture was around 1.8 per cent a year, with substantial fluctuations around the average (figure H; ERS 2006b).

Based on this information on total factor productivity in US agriculture, it is assumed here that the removal of farm support could potentially result in productivity increases over a ten year period of an *additional* 0.1 per cent a year in the heavily supported sectors and 0.05 per cent a year in the relatively lightly supported sectors. To reflect the likely time lag in realising productivity gains from the reform of farm support, the productivity gains are phased in, beginning in 2009.

fig H **annual total factor productivity growth of US agriculture**



GTEM simulation results are reported at the sector level for 2020 to incorporate all reforms and adjustments. Furthermore, the results are expressed, unless otherwise stated, as deviations from the corresponding levels in the reference case where current policies are maintained. In reporting the simulation results for certain variables (for example, gross farm income), values are expressed in 2005 US dollars.

scenarios 2 and 3 – multilateral liberalisation

In these scenarios, the complete removal of support for US farmers is complemented with the two illustrative multilateral agricultural trade liberalisation cases outlined earlier. All of the reforms implemented in the first scenario are included in these two scenarios. The details of the illustrative multilateral trade liberalisation assumptions in these scenarios are outlined in box 4.

These multilateral reforms are introduced over five years commencing in 2007 for developed countries. For developing countries, the reforms are implemented over ten years from 2007. Complete liberalisation of farm support in the United States is assumed to occur over ten years as in scenario 1.

simulation results

In the three scenarios, the gradual abolition of support for US agricultural producers, including the removal of tariff protection, would be expected to result in considerable changes in the composition of the US agriculture sector over time, relative to the reference case under which current policies are maintained. This is because support would be heavily concentrated on a limited number of commodities. Accordingly, supported sectors would be expected to contract the most, relative to the reference case, when reform was implemented.

Conversely, relative to the reference case, unsupported sectors, such as beef and fruit and vegetables, would be expected to expand as relevant resources were reallocated away from program crops and other heavily supported industries.

Such an outcome would be consistent with the notion that providing support to farm program crops constrains production of high value products for which there is growing demand both in the United States and for exports.

scenario 1 – eliminating US farm support

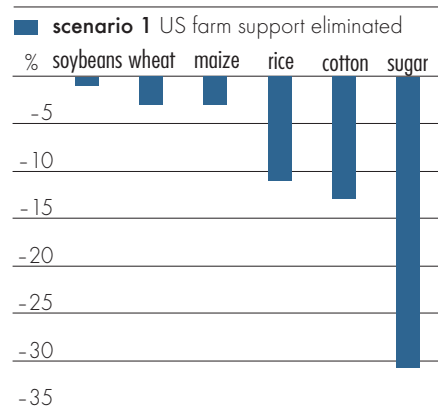
The removal of domestic support arrangements for the highly supported program crops (rice, wheat, maize, soybeans and cotton) is estimated to result in a reduction in production of these commodities, relative to the reference case (figure 1).

Among the program crops, the largest reductions in production under scenario 1 are expected to occur for cotton and rice, which are estimated to decline by 11 per cent and 13 per cent respectively by 2020, relative to the reference case. These are sectors that receive particularly high levels of support. Under scenario 1, the program crop sectors of soybeans, maize and wheat are estimated to incur relatively small declines in production by 2020, relative to the reference case – just under 1 per cent for soybeans and around 3 per cent for wheat and maize. This is because of the lower levels of support for these commodities compared with rice or cotton. These are also relatively efficient agricultural industries and are important in world markets. Reduced US production in sectors such as maize could potentially have a noticeable upward effect on world prices and partially offset the effect of removing domestic support.

In addition, the establishment of mandatory requirements to use renewable fuels (including ethanol) and the provision of tax concessions for the production and consumption of ethanol in the United States are expected to raise the demand for maize by the ethanol industry, which may potentially translate into higher maize prices and a diversion of maize away from other domestic uses (see box 5). The impact on the maize industry of developments in the ethanol industry is not modeled in the current analysis.

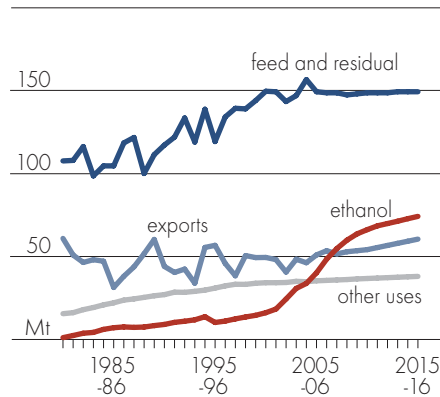
There is also an estimated contraction in output of sugar cane and beet, relative to the reference case, as the removal of market price support substantially lowers returns in these industries. US cane and beet producers are provided price support via market access barriers on sugar. If these were to be eliminated, then it is expected that imports would increase and the internal price would fall. In response to the internal price fall, production of cane and beet sugar is estimated to decline by 31 per cent in 2020, relative to the reference case (figure 1).

fig 1 **change in US crop production under scenario 1, 2007–20**
relative to the reference case



box 5: impact of future growth in US biofuels production

The United States is the world's second largest producer of biofuels, with Brazil being the largest producer. Ethanol made from maize is the principal biofuel in the United States (OECD 2006). Nearly all of US biofuel production is ethanol and 95 per cent of the ethanol is produced from maize (PM&C 2005). US ethanol production has been expanding rapidly in recent years. As such, ethanol production represents a significant and growing source of demand for maize (ERS 2006b).

major uses for US maize**production capacity of the US ethanol sector**

In 2005 the annual production capacity of the US ethanol sector was 4.3 billion gallons (16.3 billion litres) from 95 ethanol refineries. Ethanol production of 3.9 billion gallons in 2005 used more than 40 million tonnes of maize (1.6 billion bushels), nearly 14 per cent of the US maize crop. In 2010, around 66 million tonnes of maize (2.6 billion bushels), or roughly 22 per cent of a projected 302 million tonne crop in that year (11.9 billion bushels), are expected to be used by the ethanol sector (ERS 2006a; Tokgoz and Elobeid 2006; US Department of Agriculture 2006b).

US government policies affecting the ethanol sector

The 'renewable fuel standard' in the Energy Policy Act of 2005 provided a major incentive to pursue ethanol production in the United States. The standard mandates that gasoline sold in the United States in 2006 must contain a minimum of 4 billion gallons of renewable fuels (15.1 billion litres), increasing to at least 7.5 billion gallons in 2012 (28.4 billion litres) (Economic Report of the President 2006). Ethanol production in 2006 is projected to reach 5 billion gallons and exceed the 2006 target (US Department of Agriculture 2006b).

continued ...

box 5: impact of future growth in US biofuels production *continued****US government policies – subsidy effect***

In addition to establishing mandates and other regulatory mechanisms, US federal and state governments encourage the production and consumption of ethanol by offering tax concessions relative to other fuels (Tokgoz and Elobeid 2006). A number of states that produce ethanol provide additional incentives (OECD 2006).

The Energy Tax Act of 1978 initiated a federal tax credit of 51 cents per US gallon of ethanol used (US13.5 cents a litre), available to refiners and blenders that mix ethanol into gasoline – the tax credit may be applied to either the federal sales tax on the fuel or the corporate income tax of the refiner or blender (ERS 2006b).

US trade policy on ethanol includes an ad valorem tariff of 2.5 per cent as well as a secondary import duty of 54 cents per US gallon (US 14.3 cents a litre). The secondary import duty is meant to ensure that the benefits of the domestic US ethanol tax credit do not accrue to foreign producers (Tokgoz and Elobeid 2006).

The growth of the biofuels sector is likely to lead to a series of potential changes in US farm policies. These policies influence maize production and therefore the amount of maize that could be used to produce ethanol. The expansion in demand for maize stemming from increased ethanol production could potentially have implications for US farm support levels.

US government policies – tax effect

The growing demand for maize by the ethanol sector may translate into higher maize prices and a diversion of maize away from other domestic uses and exports. Within the agriculture sector, the livestock industry could potentially lose through the increased cost of maize as a livestock feed ingredient. As maize prices rise, it is likely that livestock producers would increase their demand for other feed grains that can be used as livestock feed rations. The resulting higher prices for other feed grains may potentially lead to acreage shifts out of other crops, particularly soybeans, rice and cotton. US consumers would then be paying higher prices, not just for products derived from grains, such as high fructose sweeteners, but for soybeans, rice and cotton as well.

Consumer losses would be greater if higher feed costs were to force the livestock industry to reduce their herds or raise prices for livestock products, such as meat and dairy products. Higher prices for maize and other feed grains could also potentially reduce the share of US exports of grains and oilseeds on the world market (FAPRI 2005).

As with production, it is estimated that US gross producer incomes from program crops would be lower in 2020, relative to the reference case, if US farm support was removed (figure J).

The estimated changes in gross incomes would typically be larger than the changes in production because, in addition to the negative production effect, returns to producers would also tend to decline as support provided through output subsidies or tariffs was removed. Among the program crops, the largest falls would be expected to occur in rice and cotton – at 15 per cent and 19 per cent respectively – while gross incomes from wheat, soybean and maize production are estimated to decline by 3–5 per cent in 2020, relative to the reference case. As discussed earlier, the fall in prices received by cane and beet producers in the United States under scenario 1, in combination with reduced domestic production, is estimated to result in a 42 per cent fall in the gross income received for cane and beet in the United States in 2020, relative to the reference case (figure J).

Of the livestock industries, beef cattle, pig and poultry production is estimated to expand slightly under scenario 1, relative to the reference case, while milk production is estimated to decrease marginally as market price support was withdrawn (figure K).

As indicated earlier, it is important to recognise that the analysis presented here is illustrative and the potential effects estimated under the scenarios provide only a broad indication of the likely impacts on the US dairy industry. The magnitudes of the estimated impacts would be influenced by a range of factors, including the representation of US dairy support arrangements in the scenarios.

fig J change in US crop producer gross incomes under scenario 1, 2007–20 relative to the reference case

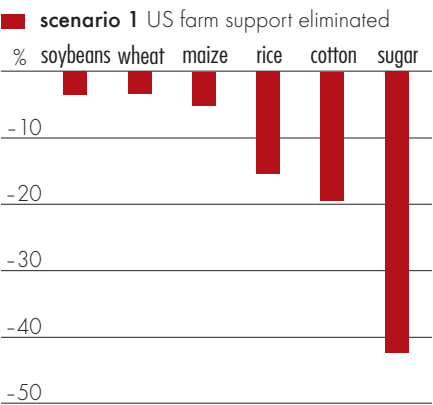
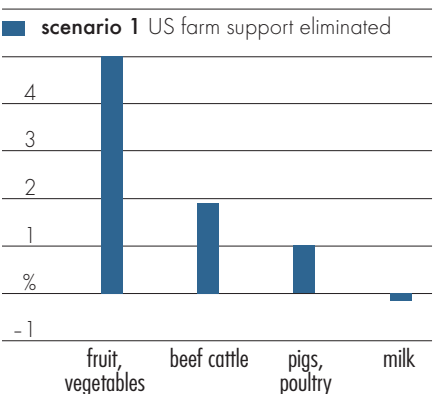


fig K change in US production of other agricultural products under scenario 1, 2007–20 relative to the reference case



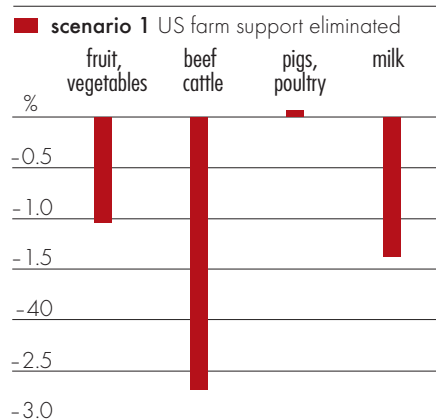
As domestic support for cropping sectors was reduced, demand for land for cropping would be expected to fall, making land more attractive for beef cattle grazing, and land allocated to this activity would be expected to increase. In scenario 1 the expansion effect of lower land costs would be likely to outweigh the effects of higher feed costs and the reduction in the small initial support levels, resulting in beef cattle production expanding slightly (2 per cent) in 2020, relative to the reference case. Pig and poultry production is less land intensive and feed costs form a higher proportion of total production costs; consequently, the estimated expansion in production is smaller – around 1 per cent in 2020, relative to the reference case. It could be argued that any potential expansion in demand for feed grains, such as maize, by the ethanol sector, may also further influence the outlook for the US livestock sector, if farm support were abolished.

The reduction in US domestic support would also be expected to lead to an estimated expansion in other agricultural sectors that currently receive little domestic support and compete with highly supported sectors for resources, particularly land (figure K). In scenario 1, fruit and vegetable production is estimated to expand by 5 per cent in 2020, relative to the reference case, as land would be reallocated away from program crops and sugar.

In the first scenario, the estimated expansion of beef cattle production would be expected to result in a fall in cattle prices. Hence the gross income received from beef cattle production in the United States, is estimated to decline by almost 3 per cent in 2020, relative to the reference case (figure L).

The gross value of pig and poultry production is estimated to remain relatively unchanged in 2020, relative to the reference case. However, relative to the reference case, dairy farmers are expected to experience a slight decline in gross income of around 1.5 per cent as a result of price support being withdrawn. The estimated increase in production of fruit and vegetables under scenario 1, relative to the reference case, is expected to lead to a small reduction in gross income for the sector as expanding production is expected to result in a marginal decline in prices (figure L).

fig L change in gross incomes of US producers of other agricultural products under scenario 1, 2007–20
relative to the reference case



scenario 2 – eliminating US farm support combined with multilateral trade liberalisation

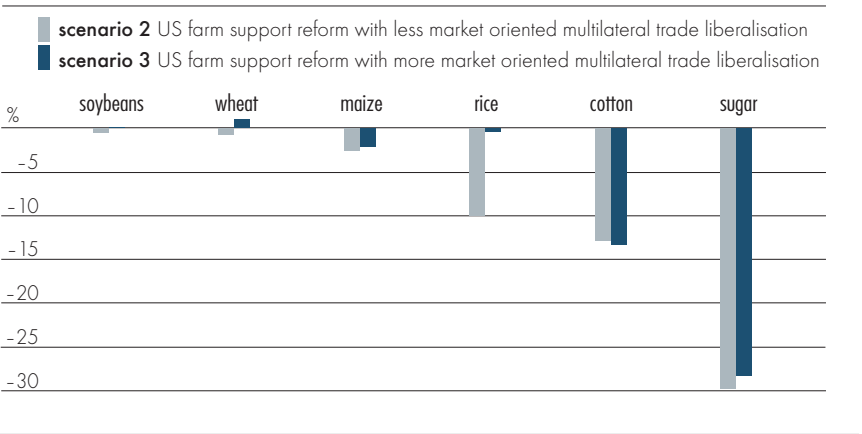
Multilateral trade liberalisation could be expected to partially offset the potential effects on US farmers of withdrawing agricultural support in the United States. The effects on individual commodities would be likely to vary depending on the extent of support provided in other countries or the market access barriers facing US exporters. Of the US program crops, there would be substantial differences in the estimated effect on the production of rice between scenarios 2 and 3.

In scenario 2, where any future multilateral reforms are assumed to be less market oriented and the market access benefits are somewhat modest, the production of rice is estimated to contract by around 10 per cent in 2020, relative to the reference case (figure M).

However, if the reforms were more market oriented in other countries (scenario 3), improved market access would be likely to almost completely offset the impact on program crops of the removal of US farm support. Consequently, the production of rice would be expected to decline only fractionally relative to the reference case. Similarly for wheat, more market oriented multilateral trade reform would be expected to reduce the adverse production impacts of the removal of US farm support. Wheat production is estimated to increase slightly (around 1 per cent) relative to the reference case (figure M).

With multilateral trade reform (scenarios 2 and 3), reductions in tariffs and declines in production in other regions, in particular the European Union, in response to cuts in

fig M **change in production for US crop sectors, 2007–20**
relative to the reference case



their own domestic support could be expected to result in increases in world prices. As a result, US producers' gross incomes from program crops would typically be less adversely affected than under the first scenario in which the United States undertook reforms alone.

For instance, in scenario 3, with more market oriented multilateral trade liberalisation, the estimated gross value of production in 2020 increases marginally for rice and by around 5 per cent for wheat, relative to the reference case (figure N).

Multilateral trade liberalisation could also be expected to contribute to a rise in world sugar prices. Under scenario 3, the reforms are estimated to result in US cane and beet production falling by 28 per cent and gross income by 39 per cent in 2020, relative to the reference case (figures M and N).

Multilateral trade liberalisation under scenarios 2 and 3 provides further incentive for US beef cattle producers to expand, particularly in the more market oriented scenario (3). In that scenario, beef cattle production is estimated to increase by close to 5 per cent in 2020, relative to the reference case (figure O). The multilateral trade liberalisation in scenarios 2 and 3 is estimated to have little impact on fruit and vegetable production, with production effects similar in all three scenarios in 2020, relative to the reference case (figures K and O).

Improved market access in the illustrative multilateral trade liberalisation scenarios is expected to lead to increasing demand for US beef exports. In scenario 3,

fig N change in producer gross incomes for US crop sectors, 2007–20
relative to the reference case

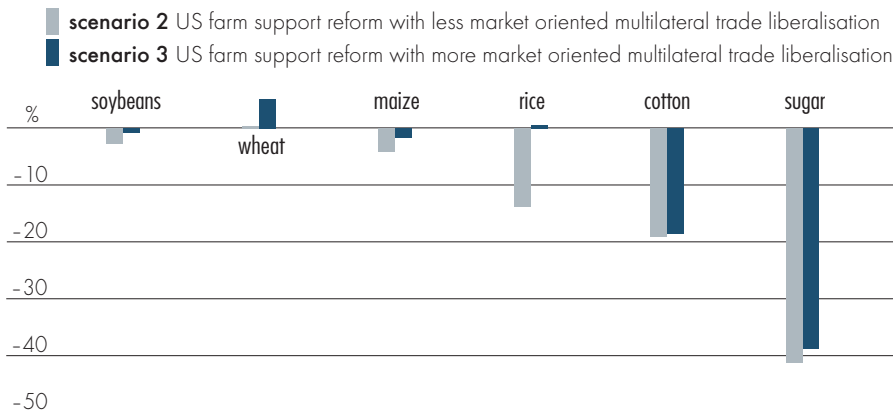


fig O change in production for other US agricultural sectors, 2007–20

relative to the reference case

- scenario 2 US farm support reform with less market oriented multilateral trade liberalisation
- scenario 3 US farm support reform with more market oriented multilateral trade liberalisation

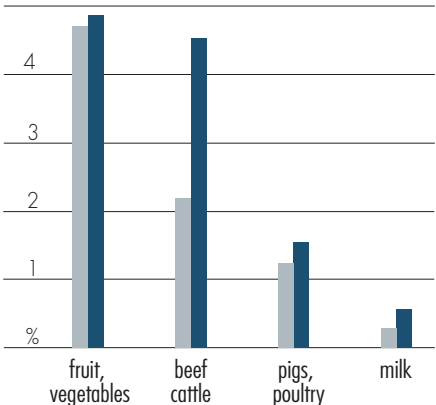
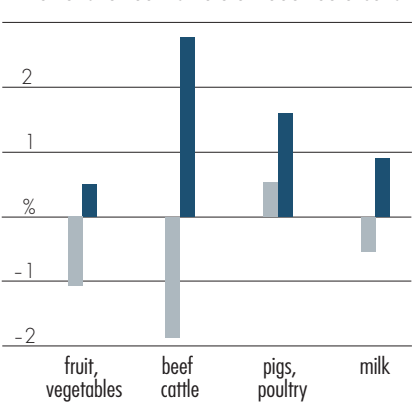


fig P change in producer gross incomes for other US agricultural sectors, 2007–20

relative to the reference case

- scenario 2 US farm support reform with less market oriented multilateral trade liberalisation
- scenario 3 US farm support reform with more market oriented multilateral trade liberalisation



where there are substantial market access gains, gross income from beef cattle production in the United States is estimated to increase by around 3 per cent in 2020, relative to the reference case (figure P).

Multilateral trade liberalisation is also expected to lead to a rise in world prices for poultry and pig meat, contributing to slightly higher estimated gross incomes for US pig and poultry producers under these scenarios, relative to the reference case. When there is substantial multilateral trade reform (scenario 3), higher world prices are estimated to lead to a slight increase in the gross incomes for US fruit and vegetable producers in 2020 (figure P).

sensitivity analysis

The question naturally arises as to how sensitive the scenario results are to changes in values of the key parameters. One of the key parameters relevant to the current analysis is annual productivity increases in the US farm sector.

In the scenarios analysed here it has been assumed that US farm policy reform would potentially lead to modest annual productivity gains of 0.1 per cent in the

heavily supported sectors and 0.05 per cent in the relatively lightly supported sectors, relative to the reference case. However, it is quite possible that productivity gains could be much higher (see box 2 for New Zealand experience).

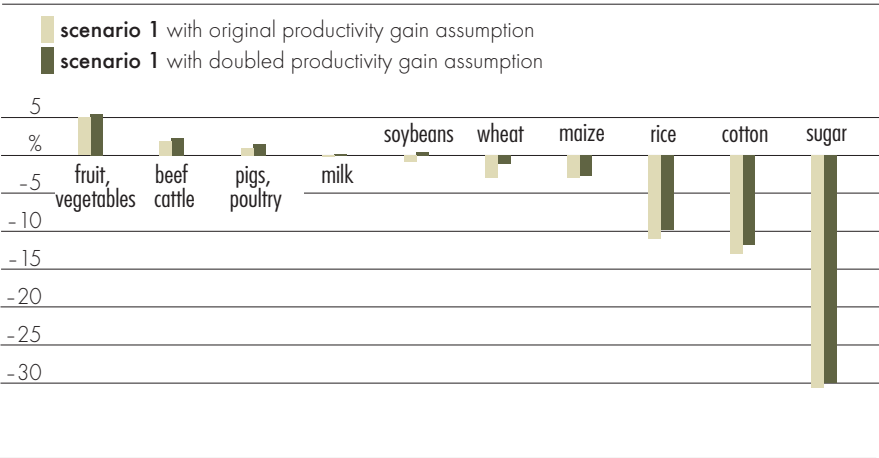
To provide an indication of the sensitivity of some important simulation results to a higher productivity response from US farm support reform, scenario 1 was repeated with the annual productivity growth assumptions doubled to 0.2 per cent for the heavily supported sectors and 0.1 per cent for the lightly supported sectors. All other assumptions for scenario 1 were maintained without change and the productivity increases were phased in over ten years as in the original scenario.

Figure Q shows the change in US agricultural production, by sector, in 2020, relative to the reference case under scenario 1 with both the original and doubled productivity assumptions.

Doubling the productivity gains has relatively modest impacts on the simulation results. In general, the negative production impacts on the program crops are reduced. In the case of soybeans, higher productivity gains could lead to a slight increase in production, relative to the reference case. Higher productivity gains could also lead to halving of the contraction in the case of wheat production under scenario 1, compared with the reference case.

When the productivity gains are doubled, the production increases for the live-stock and fruit and vegetables sectors are estimated to be slightly higher, relative

fig Q **change in production for US agricultural sectors, 2007–20, with US farm support reform and alternative productivity assumptions**
relative to the reference case



to the reference case. In the case of milk, instead of a small decrease, production increases slightly, relative to the reference case, with the increased productivity assumption. This sensitivity analysis shows that the potential gains to US agriculture from productivity gains as a result of reform could form an important component of the benefits to the United States from farm support reform.

The assumptions on productivity gains used in the present analysis have been selected to represent the lower end of the potential productivity improvements that may arise as a result of reforms to the US agricultural sector. It is possible that reform could induce even greater productivity improvements in the medium to long term that would further offset the potential effects of withdrawal of support and improve the efficiency and competitiveness of US agriculture.

domestic support inefficient at increasing farm income

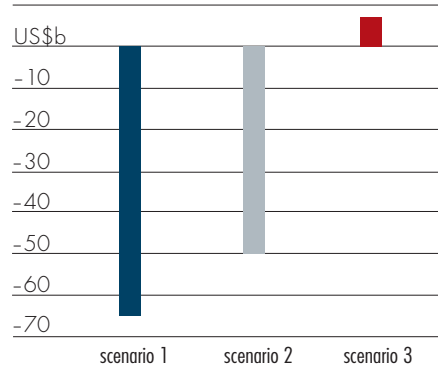
Overall, the removal of domestic support in the United States would be expected to result in structural change in the US farm sector. It is projected that there would be some contraction in the previously supported program crops. However, this is likely to be partially mitigated by the assumed potential productivity gains in those sectors as a result of reform, as farm sizes would be expected to increase and less efficient farmers would be likely to leave the industry. On the other hand, efficient agricultural industries that had not been dependent on farm support would be likely to expand as a result of the reforms, as competition for resources from supported agricultural industries would decline and additional land would be freed up for grazing and horticulture.

A key finding of this analysis is that the support provided to US farmers is a costly and inefficient way to bolster farm income. In the reference case used for this analysis, total annual domestic support provided to US farmers is projected to reach around US\$25 billion a year (in 2005 dollars) by 2020. This includes fixed decoupled payments that are expected to be notified as decoupled and not subject to WTO limits (see appendix A). In addition, some agricultural producers receive protection through market price support schemes.

In the absence of US farm support programs, the total net present value (at a discount rate of 7 per cent) of the associated budget savings over the period 2007–20 is estimated to be US\$120 billion (in 2005 dollars). On the other hand, the net present value of the decline in agricultural gross income (in 2005 dollars) over the same period is an estimated US\$65 billion under scenario 1 and US\$50 billion under scenario 2 (figure R).

One implication of this is that agricultural producers could be provided with fully decoupled WTO consistent adjustment assistance that would maintain agricultural gross incomes at current levels and there would still be a considerable budget saving in net present value terms. Under scenario 3 the net present value of the change in total US agricultural gross income over the period 2007–20 is positive at an estimated US\$7 billion (in 2005 dollars) (figure R).

fig R **net present value of change in US agricultural gross income, 2007–20**
relative to the reference case



Note that this projected result arises because the market access gains under scenario 3 would be realised early by US farmers because reforms in other developed countries were phased in over five years, while US support is assumed to take ten years to be completely removed. Therefore, under a situation where US domestic farm policy reform could be undertaken simultaneously with any future multilateral agricultural liberalisation, the adjustment assistance that would need to be provided to US farmers to maintain gross incomes would be substantially lower.

As shown in this analysis, current US farm support arrangements are very inefficient at transferring income to farmers. US farmers currently receiving support could potentially be compensated for support removal at a fraction of the cost of current policies. In addition, farm policy reform would improve the efficiency of US agriculture by removing current arrangements that are constraining production of unsupported commodities such as meat, fruit and vegetables.

Changes in the patterns of production, following agricultural policy reform, are likely to affect the viability and profitability of some farmers. The challenge for policy makers is to ensure that the benefits of farm policy reform are sufficiently widely shared so that a consensus for welfare enhancing change can be obtained. One way is to help farmers who are likely to leave the agriculture sector to get the necessary adjustment assistance to take advantage of new opportunities. Building such a consensus may be far from easy. However, the effort is well worth making, as the potential benefits are considerable (see Bernanke 2006).

The forthcoming consideration of a new US farm bill presents an opportunity to substantially reform US farm policies. Through strategic reform it is possible to benefit the US economy, without jeopardising the viability and competitiveness of US agriculture.

policy reform and industry adjustment – evidence from Australia and New Zealand

As discussed earlier, exposure to market signals and competition through farm support reform could lead to positive industry adjustment in the United States, where the farm sector has been supported. That is, reform and industry adjustment in the farm sector does not mean that previously supported agricultural industries will disappear. The economic impact of losing government support is often cushioned by other factors, as policy reforms have the effect of spurring farmers to base their production decisions on expected market returns and demand conditions experienced in a less distorted and freer trading environment.

As a part of the policy reform process, governments may have a role to play in industry adjustment (see box 6). In this context, the agricultural adjustment and reform experience in Australia and New Zealand may provide some useful insights into the future policy reform direction for the US agricultural industries that are recipients of farm support at present.

dairy industry deregulation in Australia

Over the past twenty years, Australia's dairy industry has gone through significant rationalisation and restructuring. Changes that directly affected the Australian dairy industry include the implementation of the Closer Economic Relations (CER) agreement with New Zealand in 1983 that resulted in increasing exposure to world market prices for dairy products, and the expansion of the operations of multinational food corporations.

Deregulation of the Australian dairy industry was the culmination of this process of continuous change that started in 1984. The Dairy Industry Adjustment Package (DIAP) was put in place from 1 July 2000 and comprised three programs: the Dairy Structural Adjustment Program, the Dairy Exit Program and the Dairy Regional Assistance Program.

box 6: role of government in industry adjustment

When the potential efficiency gains from policy reform outweigh the adjustment costs and distributional effects, it is best to proceed with reform. The burden of proof for the benefits of policy reform does not entirely rest with those who advocate reform. It is often the case that those who defend the status quo must prove that there is direct material harm from policy change.

The role of the government in policy reform may take the form of addressing distributional effects in the design of policy during the reform process. Ex post policy response allows governments to take into consideration new information about the effects of industry adjustment and learn valuable lessons about the reform process. It is important that governments be consistent and avoid back-tracking on policy reform once the reform process has commenced.

When distributional impacts occur in concentrated form during the reform process, the consequences are usually softened by the tax system. The social welfare safety net should be the basic mechanism that protects low income earners from the remaining adverse impacts.

It is not best practice for a government to introduce a policy change that may worsen efficiency and inequality and then choose to respond to the adverse impacts. There is simply no way a government can know all of the adjustment and distributional impacts that stem from industry reform. However, policy decisions could be improved if more information was available to policy makers on the sectoral or distributional effects of industry adjustment.

If the government provides adjustment assistance, some clear rules are required for 'efficient and effective assistance or compensation'.

- > The basis on which adjustment assistance payments are to be made must be identified.
- > The method of adjustment assistance must be transparent to ensure accountability.
- > Administrative costs should be low relative to the adjustment assistance payments.
- > The form of adjustment assistance should not generate too many distortions.
- > Adjustment assistance should be lessened over time so that it facilitates adjustment, rather than providing passive support.
- > Adjustment assistance should be paid in a form or subject to conditions that encourage individuals to move out of an inefficient industry or sector.

Source: based on Productivity Commission (1999).

Australian Government assistance to the manufacturing milk sector was phased out, followed by the removal of state government regulated domestic drinking milk arrangements. The production, processing and distribution of drinking milk had previously been regulated on a state by state basis in order to provide a guaranteed producer price for drinking milk.

Under the DIAP, industry adjustment payments to dairy farmers were made quarterly over eight years from 2000 and will cease in 2008. Payments were based on 1998-99 production, and there was neither a link between payments and future production, nor adjustments for inflation. In addition, the Dairy Exit Program provided a one-off tax free payment to the dairy farmers to exit the dairy industry. The adjustment payments were funded by a per litre consumer levy on drinking milk sales that is imposed at the retail point in the supply chain and applies to both domestic and imported products. The adjustment assistance was consistent with Australia's international commitments under the WTO and CER.

A supplementary adjustment package was announced in May 2001. This consisted of basic and additional regionally targeted payments based on the deliverance of a certain percentage of production to market milk in 1998-99, and discretionary payments to producers who were either excluded or ineligible from the 2000 package, or received artificially low payments due to adverse price movements following deregulation. These changes in dairy support caused producers who were unable to adjust and maintain their profitability to leave the dairy industry, and the remaining producers to improve on-farm efficiency by increasing the size and intensity of their operations.

Many farmers used the adjustment assistance payments to either finance an exit strategy from the industry or make investments in off-farm supplementary businesses. The rationalisation and adjustment to deregulation resulted in farm exits and the merging of enterprises whereby dairy herds were sold to other dairy farmers. This increased both average herd sizes, the degree of concentration in the industry and led to improved per cow milk yields. These developments served to transform the sector into a national industry that supplied a national retail market (table 3).

Australian dairy farmers are now highly responsive to international market signals and their returns are now subject to market forces. In recent years, Australia has become the world's third largest exporter of dairy products. Though it is likely that the pressure of competition may lead to further rationalisation, it is certain that restructuring has promoted a more efficient industry and has enabled significant growth to occur in the value of dairy production (Hogan et al. 2005).

table 3 **dairy industry adjustment in the post reform period**
Australia

		1999 -2000	2000 -01	2001 -02	2002 -03	2003 -04	2004 -05 _p
Number of farms	no.	12 896	11 839	11 048	10 654	9 611	9 256
Milk production	ML	10 847	10 547	11 271	10 326	10 075	10 125
Output per farm	KL	842	891	1 020	969	1 048	1 094
Herd size	no./farm	168	184	192	192	212	217
Milk yield	L/hd	4 996	4 859	5 215	4 913	4 925	4 983

_p Provisional.

Note: Widespread drought conditions prevailed in 2002-03 and 2003-04

Source: Dairy Australia (2005).

farm policy reforms in New Zealand

Between 1984 and 1987, New Zealand phased out farm support policies. The signing of the Closer Economic Relations (CER) agreement with Australia in 1983 was a significant factor that contributed to reform of the agriculture sector in New Zealand.

The agriculture sector now operates in a market environment that contributes to growth in productivity and incomes. Real farm incomes have recovered and in some cases are significantly higher than they were during the period of high subsidies.

The New Zealand experience has shown that subsidies and import protection led to many distortions, including the inefficient allocation of resources. The deregulation in 1984 and associated industry restructuring have led to a competitive market structure that allows for more efficient use of resources and a better response to market signals.

The two major outcomes of the agricultural reforms were productivity growth in individual sectors such as dairy, beef and sheep, and resource reallocation to high productivity sectors. Strong indicators of productivity improvements made within sectors over the past twenty years include higher beef and lamb carcass weights, increased lambing percentages and improved rates of milk solid per cow. Total factor productivity growth averaged 2.5 per cent a year in the post-1984 period compared with 1.5 per cent in the pre-1984 period (see box 2). Labor productivity has risen to almost double its level in 1983-84, and land productivity has increased by 85 per cent in the same period (figures S and T).

fig S **labor productivity**
New Zealand

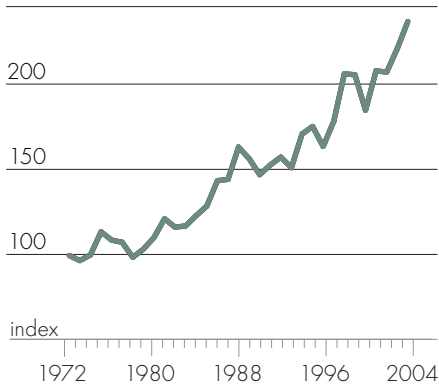
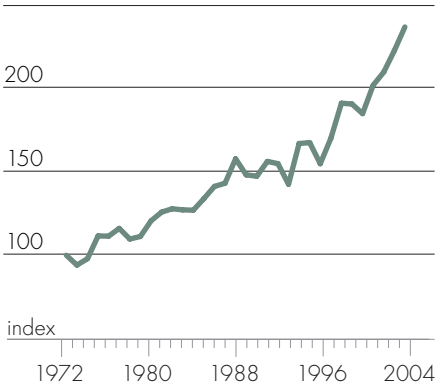


fig T **land productivity**
New Zealand



New Zealand is now the world's largest exporter of butter, skim milk powder and casein, and the second largest exporter of cheese and whole milk powder (excluding intra-EU trade). This position has been achieved without reliance on farm subsidies, and without protecting the domestic market from import competition. New Zealand's overall share of world dairy product exports continues to increase as its dairy industry develops to suit the needs of diverse markets (ABARE and MAF 2006).

2002 farm bill–key provisions for program crops

US program crops

US policies provide substantial support to producers of program crops— wheat, feed grains, rice, cotton and oilseeds. Producers can receive up to three types of government payments in addition to their receipts from the market. These payments are loan deficiency payments or marketing loans, direct payments, and counter-cyclical payments.

loan deficiency payments or marketing loans

Farmers receive market prices for farm program crops when prices are above the US government's administratively set minimum producer prices called loan rates. However, when market prices at the farmgate level fall below the loan rate, unit returns to producers are supplemented to raise them to the loan rate by subsidies termed loan deficiency payments or marketing loans. Support is provided on actual sales of program crops, and so the size of payment depends on both the quantity sold and the market price.

direct payments

Direct payments are made to eligible producers for each of the 2002 to 2007 crop years. The size of the direct payment is based on historical yield bases and 85 per cent of area bases that are established for each farmer from previous actual plantings and yields, and unit payment rates that are pre-set for each program crop in farm bill legislation. Consequently, the size of the direct payment does not change with changes in actual yields, areas planted or prices. Under the flexible planting arrangements that have applied since 1996, farmers with program crop bases receive direct payments determined on those historical bases. The payments are made for the crops that they have base areas for, even if they currently produce other crops. For example, a farmer could have a wheat base and would receive program payments derived from the wheat payment rates, but could currently plant soybeans. In the 2002 farm bill, farmers were given the option to update area bases from pre-1996 levels to 1998–2001.

countercyclical payments

A new provision for providing countercyclical support to producers was introduced in the 2002 farm bill. This provision is based on target prices established for each commodity. In many ways this program is very similar to the deficiency payments system that operated until the 1996 farm bill.

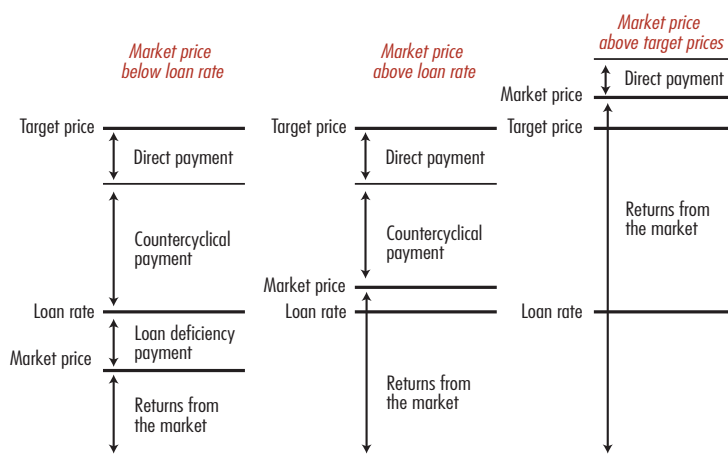
The countercyclical payments are made when the 'effective' price is less than the target price. The 'effective' price for each crop will be equal to the sum of:

- > the unit payment rate for fixed decoupled payments and
- > the higher of the twelve month season average price and the loan rate.

The countercyclical payment is equal to the difference between the target price and the 'effective' price, multiplied by the yield base and 85 per cent of the area base. If producers elected to update their area base, they could also choose to partially update their yield base for the purpose of calculating the countercyclical payment. The 2002 legislation provides for this yield update to be on a once only basis.

The countercyclical payment provision provides for increased support when market prices decline. Production decisions, at least up to 85 per cent of the base area, are influenced by the prospect of always having returns that are at least equal

fig U returns under US support provisions



to the target price. Whenever market prices are below the target price these returns would be made up of a combination of market returns, loan deficiency payments (based on current prices, the loan rate and current production levels), fixed payments (based on a potentially updated area base, a fixed yield base and the crop payment rate) and countercyclical payments (based on a potentially updated area base, a potentially updated yield base and current prices).

The relationship between market prices, loan deficiency payments, fixed payments and countercyclical payments is shown in figure U. Support rates and prices in the 2002 farm bill along with average market prices in recent years are shown in table 4.

table 4 **policy settings under the 2002 US Farm Security and Rural Investment Act and farm level market prices**

	wheat	maize	barley	sorghum	cotton	soybeans	rice
	US\$/bus	US\$/bus	US\$/bus	US\$/bus	US\$/lb	US\$/bus	US\$/cwt
Loan rate							
2002-2003	2.80	1.98	1.88	1.98	0.52 ^a	5.00	6.50
2004-2007	2.75	1.95	1.85	1.95	0.52 ^a	5.00	6.50
Direct payment							
2002-2007	0.52	0.28	0.24	0.35	0.067	0.44	2.35
Target price							
2002-2003	3.86	2.60	2.21	2.54	0.724	5.80	10.50
2004-2007	3.92	2.63	2.24	2.57	0.724	5.80	10.50
Market price (at farm)							
2001-02	2.78	1.97	2.22	1.94	0.298	4.38	4.25
2002-03	3.56	2.32	2.72	2.32	0.445	5.53	4.49
2003-04 ^s	3.40	2.40	2.83	2.38	0.625	7.40	7.48

^a Upland cotton. The policy setting for extra long staple cotton was US\$0.7977/pound in both periods. ^s Estimate.
Source: ERS (2004a).

2002 farm bill – key provisions for sugar and dairy

sugar policy

The main aim of US sugar policies is to support returns to domestic producers. Consequently, the sugar industry ranks as one of the most heavily supported agricultural activities in the United States. The main elements of the US farm bill for sugar are the provision of basic price support to sugar producers through the loan rate and marketing allotments.

loan rate for sugar

The loan rate is the price at which the US Government provides loans to millers and processors to hold sugar for sale at a later date. These loans are obtained from the Commodity Credit Corporation (CCC) and have a repayment period of up to nine months. Raw cane sugar and refined beet sugar are used by millers and processors as collateral for the loans. When the sugar is sold the miller or processor repays the loan to the CCC. These loans are of a 'nonrecourse' nature, meaning that rather than repaying the loan, processors could choose to forfeit stocks to the CCC. They would normally forfeit stocks if market prices were insufficient to repay the loan (plus any interest, storage or transport costs incurred). As a result, the loan rate tends to place a floor under the domestic price.

Having been guaranteed a minimum domestic market price for their sugar, millers and processors are required to pay producers a fixed minimum price for cane and beet. Under the 2002 farm bill, loan rates are set at US18 cents per pound for raw cane sugar and US22.9 cents per pound for refined beet sugar. Marketing allotments are the provision of marketing rights to millers and beet processors on the basis of historical production, production capacity and the ability to market sugar. If allotments are implemented, millers and processors are not permitted to sell sugar on the domestic market in excess of their allotment. Any sales that exceed the allocated allotment are subject to penalty rates. Allotments were initially implemented in response to concerns about the apparent excess of available sugar (domestic production plus imports) over domestic requirements.

Marketing allotments were authorised between 1991 and 1995, under the 1990 farm bill, suspended under the 1996 farm bill and reimplemented in the 2002 farm bill.

Marketing allotments are allocated by the Secretary of Agriculture such that the marketing of sugar processed from beets and domestically produced sugar cane should not result in forfeitures of sugar to the Commodity Credit Corporation. As such, allotment levels are adjusted in response to changes in consumption, stocks, production or imports.

dairy policy

price support programs

Price support for the US dairy industry is underpinned by quota restrictions on imports of dairy products, government intervention buying by the CCC and export subsidies on dairy products. Policy settings covering CCC intervention buying are established in the farm bill. The CCC purchases dairy products (butter, cheddar cheese and nonfat dry milk) at support purchase prices that are sufficiently high to ensure that the price for manufacturing milk is at or above the milk support price (Doyle, Roberts and Connell 1995).

The milk support price is currently set at US\$9.90 per hundred pounds (cwt) (ERS 2004). Under the 1996 farm bill, the purchase price support program was to have ended on 31 December 1999, but was twice extended for one year (to the end of 2000 and then 2001). The 2002 farm bill continues the milk price support program through to 2007.

fluid milk marketing

Federal milk marketing orders were first authorised by the Agricultural Marketing Agreement Act of 1937 and have been modified many times since then. There are four classes of milk utilisation defined in federal orders (US Department of Agriculture 2005):

- > **class I** includes plain and flavored whole milk, fat reduced milks and eggnog
- > **class II** includes milk used for cream, cottage cheese, frozen deserts and other food products

- > **class III** includes milk used to produce hard cheeses and cream cheese
- > **class IV** includes milk used to produce butter and any milk product in dried form.

Minimum prices are set for the various classes of milk, with the highest prices for class I milk. The marketing order system tends to complement the national price support system by raising returns to US milk producers through premiums financed by domestic consumers (Doyle, Roberts and Connell 1995). The average prices for each class of milk in 2004 were as follows (US Department of Agriculture 2005):

- > **class I** US\$17.56 per cwt
- > **class II** US\$13.86 per cwt
- > **class III** US\$15.39 per cwt
- > **class IV** US\$13.20 per cwt

Not all areas of the United States are covered by federal milk marketing orders. California, the major milk producing state, has its own milk marketing program.

national dairy market loss payments

A program for direct countercyclical payments to milk producers was introduced in the 2002 farm bill. Eligible producers can receive a monthly payment calculated as 45 per cent of the difference between US\$16.94 per cwt and the monthly class I price in Boston announced under Federal Milk Marketing Order 1 multiplied by their monthly 'eligible milk production marketed'. The payment for a single farm is only made on the basis of eligible production, up to 2.4 million pounds per financial year. Producers may not reorganise dairy operations for the sole purpose of receiving additional payments (ERS 2004). This program covered eligible milk production from 1 December 2001 to 30 September 2005.

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