

# **Can made to measure protection ever be optimal?**

## **Theory and its application to Australia.**

**The case of structural unemployment caused by terms of trade  
volatility combined with sticky real wages.**

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### **Abstract**

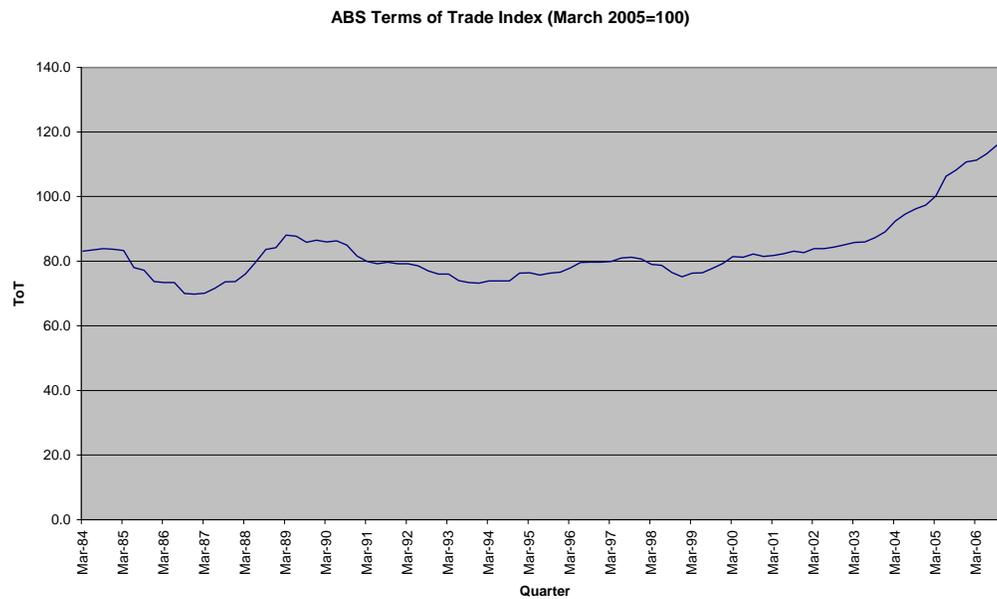
Mussa's 1974 small country specific factors trade model is presented with exportable goods and importable goods as being the two products of the economy. The two specific factors of production are assumed to be two specialised types of labour. This model is then extended by assuming that real wages in both of the labour markets are assumed to be fixed. In such a model, a change in the terms of trade will produce structural unemployment in the sector which has experienced a fall in its relative price for a long as the real wage remains downwardly rigid. It is possible for the government to protect the industry whose relative price has fallen in order to eliminate this structural unemployment. To achieve this, as the terms of trade change, the level of protection would need to be precisely varied so as to stabilise relative domestic prices. The elimination of structural unemployment resulting from such protection would result in a benefit to aggregate welfare. Protection also imposes the standard cost arising from the mobile factor of production not moving to where it is most highly valued. The welfare costs and benefits of such protection are illustrated diagrammatically. It is possible that such protection results in a net improvement in welfare, meaning that the model might provide a second-best argument for protection. There is more likely to be a net welfare benefit when the terms of trade change is both short-lived and known in advance to be so. The extent to which this model is applicable, both generally and in the case of Australia, is discussed.

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## Introduction and literature review

Australia is currently experiencing an enormous rise in its terms of trade (ABS), largely caused by a commodity price boom (RBA). In a standard macroeconomic model with nominal rigidities in prices and/or wages this will lead to higher real output and lower unemployment rates.



## RBA Index of Commodity Prices

SDR, 2001/02 = 100



However, in a real trade model (Mussa (1974)) that contains both an exportable and an importable industry, there will be a relative decline in the size of the importable industry. For the purposes of this paper, the two specific factors of production are assumed to be two different types of skilled labour and the single variable factor of production will be termed capital.

While this sounds similar to the concept of Dutch disease it is modelled quite differently. Dutch disease models (Corden and Neary (1982)) assume that the terms of trade is fixed and the only change in relative prices is between an aggregated tradable and an aggregated non-tradable sector. Dutch disease models assume that the booming export sector is driven by an increase in productivity, rather than an increase

in its price compared to the importable sector. If there are two types of specific labour and one mobile factor of production, then the market clearing wage for labour specific to the importable industry would fall and there would be no involuntary unemployment in either labour market. However, if the real wages of these specialised types of labour are assumed to be sticky downwards, then this would result in structural unemployment (Corden (1984)). Corden does not quantify the efficiency costs of the structural unemployment.

This structural unemployment imposes a welfare cost on the economy. Trade protection could theoretically be designed in order to stabilise domestic relative prices. This could eliminate the structural unemployment. In order to achieve this goal, the rate of protection would need to constantly change as the terms of trade changes. In practice, the forms of protection that nations actually impose are not this flexible.

Protection would also impose a cost on the economy as the mobile factor of production does not move to where it is most highly valued. It is conceivable that the discounted benefits of imposing the protection are higher than the discounted costs of imposing protection. This would provide a second best argument for protection.

In this paper, the terms of trade change is assumed to be temporary as distinct from the one-off change envisaged in the case of Dutch disease.

### **Mussa's Theoretical model**

The two industries are the exportable and importable sectors with the price ratio of exportable goods to importable goods being the terms of trade. The shock to the economy is a rise in the terms of trade (fall in  $P_m/P_x$ ). Productivity is assumed to be unchanged.

Each of the factors skilled exportable labour, skilled importable labour and capital has two real rates of return measured in terms of both the exportable and importable good and an aggregate real rate of return measured in terms of a weighted price index of the two goods. Supply of each of these three factors is assumed to be fixed and thus unresponsive to their respective rates of return.

Naming the mobile factor of production to be capital is arbitrary, especially as capital is not normally thought of as being relatively mobile. It could alternatively be called unskilled labour. However, the difficulty with calling the mobile factor unskilled labour is that it gives the impression that unemployed skilled labour could find alternative employment in the unskilled sector. The model assumes that the specific factors can't metamorphose into the mobile factor. This enables the possibility of skilled labour becoming unemployed.

In the diagram below there are two real wages for the two different types of labour. Initially these are assumed to be flexible. There is no reason to expect that real wages would be the same in the two distinct labour markets.



interest rate would have increased. This means that the return to labour specific to the exportable sector has also risen in terms of the exportable good.

Skilled Labour specific to the importable sector unambiguously loses in terms of the importable good (from AED to ABC). It loses by more when measured in terms of the exportable good because its relative price has risen.

### **Extending Mussa's theoretical model by fixing the two real wages**

In order to create the possibility of involuntary unemployment to exist the two skilled real wage levels are now assumed to be fixed at the initial market clearing levels in terms of a consumption basket of the prices of both exportable and importable goods. The real interest rate is still assumed to be flexible so that capital is always fully employed.

The rise in the terms of trade now results in unemployment amongst labour specific to the importable sector. This is because the amount of capital in the importable sector has declined. While the equilibrium real wage for specialist importable labour has fallen measured in terms of both goods, the real wage is fixed leading to unemployment.

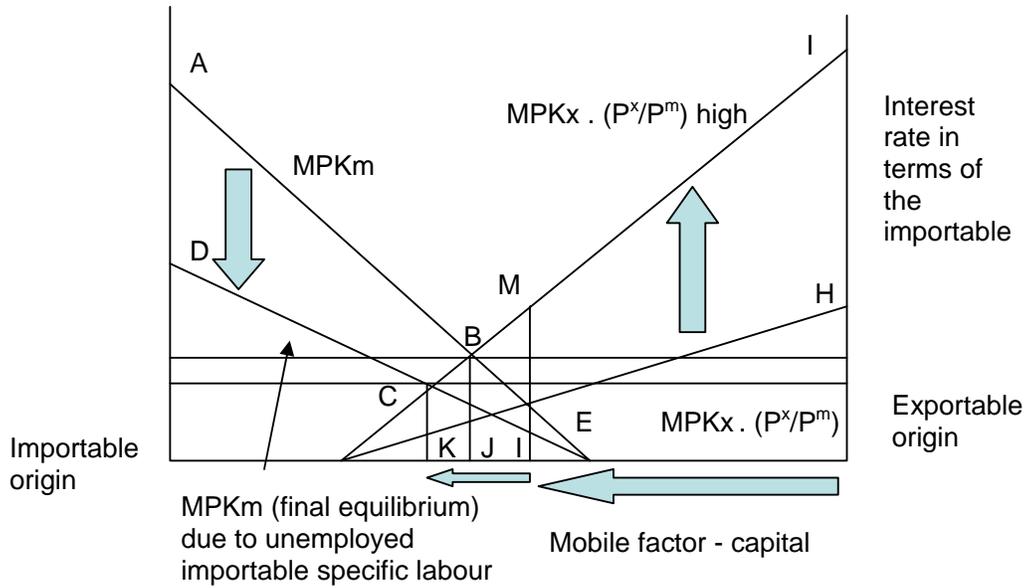
Unemployment of labour specific to the importable sector would cause a fall in the marginal productivity of capital in the importable sector because the capital has less employed labour to work with. This causes a downward swiveling of the MPK<sub>m</sub> schedule.

As the marginal product of capital in the importable sector falls, the level of structural unemployment rises further. In turn, this causes a further fall in the marginal product of capital and so on. Assuming that the effect reduces with each feedback round then a stable equilibrium will be approached. The downward swivel in the marginal product of capital in the importable sector (final equilibrium) that is drawn in diagram 2 below is the final equilibrium that is approached through a geometric sequence.

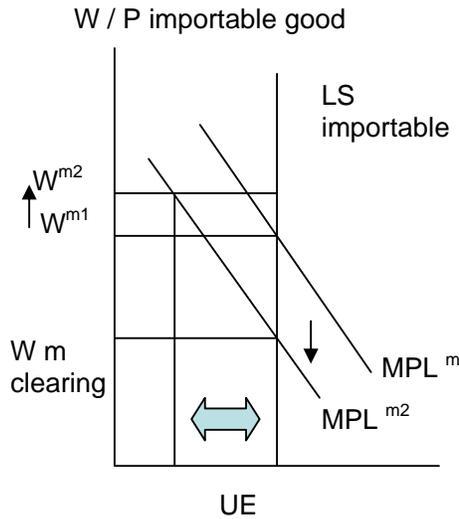
Similarly, there will be a shortage of labour specific to the exportable sector. The equilibrium specialised real wage has risen but the actual real wage is assumed to be fixed.

The assumption that the supply of both types of labour are fixed, means that from the perspective of economic efficiency, it makes no difference whether real wages in the two labour markets are assumed to be sticky in both directions or just sticky downwards. The full employment level of output is fixed. Relaxing the assumption that both the two real wages are sticky upwards as well as downwards would, however, effect the distribution of income.

Diagram 2: A rise in the terms of trade ( $P^x/P^m$ ) with 2 types if labour being the specific factors of production with fixed real wages



**Diagram 3: The market for labour specific to importables with fixed real wage in terms of a consumption bundle.**



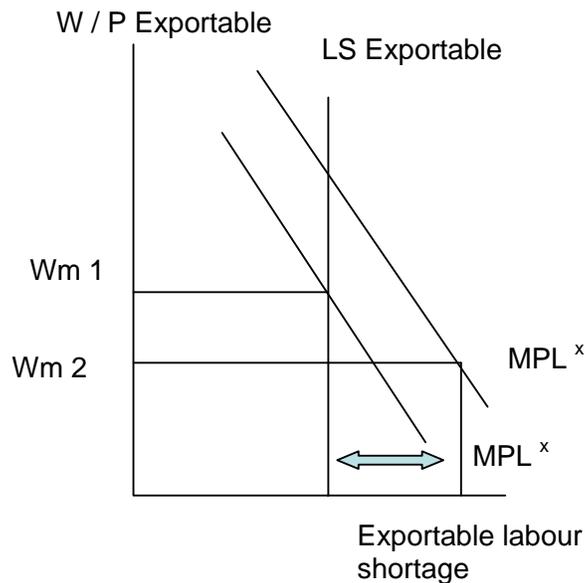
In the specific factor model, the supply of each factor is assumed to be unresponsive to returns.

The amount of capital in the importable good sector has declined.

This reduces the marginal product of labour in terms of the importable good from  $MPL^m$  to  $MPL^{m2}$ .

If the importable sector real wage is fixed in terms of a consumption basket then it has risen in terms of importables from  $W^{m1}$  to  $W^{m2}$  because the relative price of importables has fallen.

**Diagram 4: The market for labour specific to exportables with fixed real wage in terms of a consumption bundle.**



The amount of capital in the exportable industry has risen, increasing the marginal product of labour specific to exportables from  $MPL^x$  to  $MPL^{x2}$ .

If the real wage in the exportable sector is fixed in terms of a consumption basket then it has fallen in terms of exportables from  $W_{m1}$  to  $W_{m2}$  because the relative price of exportables has risen.

## **Costs and benefits of a production subsidy in the importable sector given fixed real wages**

The first best policy is to have a perfectly competitive labour market with wage rates that are not contracted in advance. However, for the purposes of this model, it is assumed that the fixed real wages in the two labour markets are given.

Even though the real terms of trade has risen, the government can impose a made to measure production subsidy in the importable sector, or an equivalent tax on production in the exportable sector, set at a level designed to keep a fixed domestic relative price of the exportable good to the importable good. The reason why a production subsidy or tax is chosen as the policy tool used to implement protection is that it means that we don't have to worry about consumers in the economy facing relative prices that deviate from world prices. Unlike in the case of an import tariff or export subsidy, any inefficiency caused by the protection would only result from the production side.

There is no government sector in this model. It is assumed that any production subsidy in the importable sector is financed by non-distorting taxes. Similarly any equivalent production tax in the exportable industry is used to pay for non-distorting lump sum subsidies.

The cost of an importable production subsidy is MBE measured in terms of the importable good. This cost arises because the mobile factor capital does not move to the exportable sector where it is more highly valued. These costs are ongoing for as long as the terms of trade stays at its new level.

The benefits of maintaining the subsidy on producing the importable good or equivalent tax on producing the exportable good are ABCD in terms of the importable good. This is the value of the output that would have been otherwise lost as a result of unemployed labour in the importable sector. It is the area between the marginal product of capital schedules in the importable sector that apply if there was full employment in the importable sector compared to when there is unemployed labour in that sector. These benefits only last as long as the real wage is assumed to remain sticky. This is because in this model, it is the stickiness of the real wage that leads to the unemployment in the first place.

Another intuitive way of reaching this result is to compare the level of output measured in terms of the exportable in three different situations.

- 1) Before the terms of trade change, the level of output is AEH and the allocation of capital is at I.
- 2) After the terms of trade rise and real wages are sticky, the level of output is DCI and the allocation of capital is at K.
- 3) When we are in situation two above, except that a production subsidy is paid to the importable sector to stabilise relative producer prices and restore the allocation of capital to I, then the level of output is AEMI. This confirms that the net efficiency gain of the production subsidy is area ABCD minus area BEM.

It has been demonstrated that under the previously mentioned assumptions, a tariff designed to keep relative domestic prices stable could possibly improve efficiency relative to free trade. This does not mean that this would be the tariff rate that maximises efficiency. The efficiency maximising rate would be when the marginal increase in the deadweight loss due to the tariff would equal the marginal reduction in the deadweight loss caused by the resulting lower structural unemployment.

Alternatively, if there was instead a fall in the terms of trade instead of a rise, then by a parallel argument to the one above, in the face of real wage rigidities it might be a second best policy to impose either a subsidy on production of the importable good or an equivalent subsidy on production of the exportable good.

If real wages in the exportable market were instead assumed to be initially set above the market clearing level then the welfare results would be very different. A rise in the terms of trade would reduce the level of structural unemployment in the exportable sector and increase it in the importable sector. The net effect on some aggregated measure of structural unemployment would be uncertain. Consequently, given this alternative assumption, it would be very unlikely that protection would be a second best policy.

In the very long run we could assume that there is only one type of homogenous labour with perfectly flexible real wages. Both labour and capital markets exhibit perfect competition. The above model would then reduce to the Heckscher-Ohlin

model. Labour, in addition to capital, would then also move to where it is most highly valued.

### **Does volatility in a nation's terms of trade actually impose a cost?**

The model used in this paper also predicts that a volatile terms of trade will *ceteris paribus* reduce output levels. Mendoza (1997) makes the empirical finding that increased terms of trade volatility reduces the rate of economic growth. Mendoza however interprets his empirical results assuming a full-employment model with risk averse agents. Bleaney and Greenaway (2001) support Mendoza's empirical results when it comes to sub-Saharan Africa.

Australia's terms of trade were unusually volatile during the period 1923 to 1952 (Gillitzer and Kearns (2005)) and the model may have consequently had more applicability then than it has since that time.

### **Policy implications arising from the theory**

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If the terms of trade increase is temporary then it is more likely that the discounted benefits of protection exceed the discounted costs. This is because it is likely that in practice that any rigidity in real wages is only likely to last for a finite time. Accordingly the benefits of made to measure protection are only likely to last for a finite time. The costs of protection set at rate designed to stabilise domestic prices, will last until the terms of trade revert to their original level. Thus the benefits of

protection depend on the inflexibility of the labour market while the costs of this particular form of protection increase with the duration of the terms of trade change.

It is difficult for policy makers to know ex-ante whether the terms of trade increase is temporary or permanent. They also may not know the future course of real wages and consequently unemployment. This information would be needed to decide if the discounted value of the benefits of protection exceed the discounted value of the costs of protection.

While the model has been characterised here as assuming an exportable and an importable good, it could be equally applied to relative price movements between any two domestically produced goods in which the country is a price taker that are produced by labour with specific skills.

Also real wages might have become less rigid over time with deregulation of the labour market in Australia. This would be particularly true when compared with the days of wage indexation. This would make the second-best rationale for protection less relevant over time for the case of Australia.

Many Australians are still employed on enterprise bargains or individual contracts which allow for predicted but not actual inflation rates. In the environment of lower inflation in Australia since the 92/93 recession, any downward rigidities in nominal wages would lead to increased downward rigidities in real wages. However, steady increases in productivity would gradually increase equilibrium real wages over time, thus offsetting the significance of the reduction in the inflation rate.

This model assumes that skilled labour cannot be retrained. In practice, governments spend a lot of resources retraining labour that has been laid off from contracting industries (House of Representatives (2006)). If this is possible then this could solve the structural unemployment problem in a way that imposes a lower cost than imposing made to measure protection.

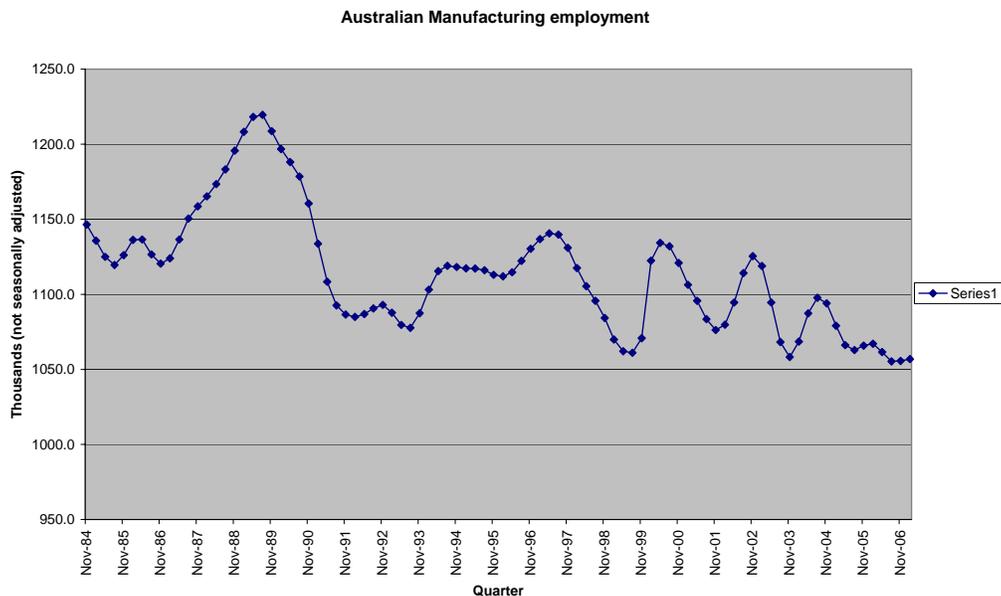
### **Is structural unemployment widespread?**

The higher the level of structural unemployment, the more applicable this model is likely to be. Macroeconomic estimates of the NAIRU (McDonald (1992)) often estimated that the NAIRU appears to lag the value of the actual unemployment rate. Given that the NAIRU is sometimes taken to be a proxy for the level of structural unemployment, this macroeconomic approach gives a high estimate of the level of structural unemployment.

Heaton and Oslington (2002) found that only 40% of the changes in the unemployment rate in Australia resulted from shocks that only affected one sector of the economy during the period 1978 to 1994. Their approach gave the impression that structural unemployment formed a small proportion of total unemployment.

The model in this paper does not appear to be applicable to the current state of the manufacturing sector in Australia. There is no evidence that the current terms of trade rise in Australia is associated with higher levels of structural unemployment amongst those who worked in the manufacturing sector as a whole. This model also does not

appear to match the smaller terms of trade rise in the late 1980's which coincided with dramatic declines in the rate of protection. About 10% of the unemployed in February 2007 used to work in the manufacturing industry in the last two years (ABS 6291.0.55.003 Labour Force Australia, Detailed, Quarterly). However, this is about the same proportion as work in manufacturing in the workforce as a whole and consequently does not indicate structural unemployment. While manufacturing employment has steadily declined as a share of total employment in Australia, the absolute level of manufacturing employment has remained relatively steady since the 91-92 recession (see chart below).



It might, however, be the case that there is currently structural unemployment among those who have skills specific to the car and associated component manufacturing industries. When surveying the unemployed about the previous industry they worked for, the ABS does not disaggregate any further than the manufacturing sector as a whole.

However, the Australian Metal Workers Union conducted a survey in February 2006 of those who became redundant in from two motor vehicle component manufacturers between August and October 2005 (House of Representatives (2006)). The survey found that only 37.2% of the former workers were employed and of those who were employed, 89.7% suffered a reduction in wages and of these, the average wage reduction was 28.3%. Of those who were not working, 29.5% were unemployed, 5.1% retired prematurely, 5.3% retired at an appropriate age and 23.1% were not looking for work.

The Australian car industry is experiencing a trend decline rather than suffering from a temporary and short-lived fall in output prices. Consequently, it would be unlikely that a second best case for protection could be argued using the model in this paper.

### **Conclusions**

It is conceivable that a varying tariff that was aimed at stabilising volatile domestic prices could result in a second best net improvement in welfare despite the costs of protection. This is more likely to be true if the government somehow knew that the terms of trade would be short-lived. Political and practical considerations would mean that in practice it is extremely unlikely that a government would impose such a carefully formulated production subsidy. The government is unlikely to have prior knowledge of the longevity of the terms of change. Also the gradual increase in the flexibility of real wages over time in Australia, despite reduced inflation rates, has reduced the likelihood of structural unemployment. It is possible that retraining or

relocation initiatives would provide a less costly way of reducing structural unemployment than imposing protection.

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