Trade Adjustment Assistance and Pre-Displacement Wages

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Abstract
This paper investigates how Trade Adjustment Assistance (TAA) affects pre-displacement wages in imperfectly competitive labour markets, using both an efficiency wage and a bargaining model. Our results reveal that under both frameworks employment subsidies for displaced workers raise pre-displacement wages. By contrast, subsidies to unemployed displaced workers unequivocally raise pre-displacement wages only in the bargaining model.

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Section I: Introduction

While trade liberalisation can be hugely beneficial on aggregate, there will almost invariably be groups who lose out over the course of the adjustment process. In this regard it is widely recognised that compensating dislocated workers, besides smoothing the cost of frictional unemployment, can help defuse opposition to liberalisation by distributing some of the gains to these groups. As a matter of fact, survey evidence provided by Sheve and Slaughter (2001) indicates that a majority of American workers would be in favour of further liberalization provided that those who are harmed receive some sort of compensation or assistance.

Trade adjustment assistance represents one such form of compensation. Baicker and Rehavi (2004) provide a review of the history of trade adjustment assistance (TAA) in the US. It was formally introduced in the US Trade Expansion Act of 1962 to

compensate workers for tariff cuts under the Kennedy Round of multilateral negotiations. Similar provisions were included in the Canadian-American Auto Agreement, the Manpower Development and Training Act of 1962 and the Economic Opportunity Act of 1964. A separate trade adjustment assistance programme was introduced for job disruptions associated with NAFTA in the early 1990s. In 2002 the US Congress demanded a substantial expansion of TAA in exchange for the renewal of Presidential trade negotiating authority. The 2002 Act expanded eligibility to secondary workers at an affected firm's upstream suppliers and downstream customers and to workers laid off in plant relocations. In addition, cash benefits to workers in certified firms were extended to 78 weeks rather than the previous 52, and higher job search and relocation allowances were made available. A new pilot scheme, as proposed by Kletzer and Litan (2001), was also introduced for workers aged 50 and above. This provides them with cash benefits equal to 50 percent of the difference between their new and old salaries if reemployed at lower wages within 26 weeks of separation, subject to earnings of less than a set amount, and also offers temporary subsidies to help pay for health insurance.

Interest in TAA has expanded further in recent times. One of the first bills introduced in the new Democratically-controlled US Senate would expand TAA to cover not only manufacturing workers but also service workers whose jobs are deemed to have been offshored, and would offer help not just to individual factories but to entire industries. Germany since 2003 has operated a scheme which sees the government make up 50 percent of the wages lost by people above a certain age who are forced into a lower paying job, while France operates a similar scheme without age restrictions. More

recently, the European Union has created a €500 million ($650 million) fund to help those who lose their jobs because of "structural changes in world trade patterns".

Possible adverse effects of such types of schemes have been identified by Baicker and Rehavi (2004). Noting the well-documented spike in the likelihood of an unemployed worker being reemployed at the time that benefits expire, they point out that increasing the generosity and length of time for which TAA benefits are available could increase the average duration of unemployment, while the wage subsidies offered to bridge the gap between workers' new and old salaries reduce the incentive to seek out the highest-paying available jobs. They also point out that firms may be induced to lay off workers seasonally because they pay less in unemployment insurance taxes than workers receive in benefits for each layoff.

From a theoretical perspective, Brecher and Choudhri (1994) originally demonstrated that the Dixit and Norman (1986) result that commodity taxes could be used to compensate the losers without exhausting the benefits from freer trade may not be possible in the presence of unemployment. Feenstra and Lewis (1994) show that similar problems also arise when factors of production are imperfectly mobile, though they suggest that the use of commodity taxes *coupled* with trade adjustment assistance may be adequate to achieve true Pareto gains from liberalization. As Davidson and Matusz (2005) point out, however, Feenstra and Lewis do not address the question of whether there may be a superior way to achieve this goal. Davidson and Matusz (2005) thus set themselves the goal of finding the labor market policy that fully compensates declining-sector workers while imposing the smallest distortion on the economy. They find that the

best package consists of a wage subsidy to those who switch sectors after liberalization, combined with an employment subsidy to the declining sector. [2]

The literature on trade adjustment assistance, however, typically ignores the possible impact of such a policy on pre-displacement wages. In Davidson and Matusz (2005), for example, the wage paid reflects the marginal productivity of labour which remains unchanged in the face of TAA. In imperfectly competitive labour markets, by contrast, the wage is also typically influenced by the workers' outside option, and this in turn is influenced by the presence or absence of a trade adjustment assistance program[3]. This insight accords well with the logic of TAA as discussed above. If workers are more likely to support trade liberalisation in the knowledge that they will be compensated in the event of job loss, it implies that fear of displacement, and hence the perceived outside option, is affected by the policy. Thus, TAA may feasibly drive up the wages of workers in potentially eligible firms, raising the possibility that trade adjustment assistance further increases the likelihood of displacement. Under what circumstances this may happen is therefore clearly important for properly evaluating the possible effects of TAA on the labour market.

In this paper we set out to explicitly model the impact of TAA on pre-displacement wages within an imperfectly competitive labour-market framework. In this regard we resort to commonly used models of imperfectly competitive labour markets:

[2] Barry (1995) critiques an earlier literature on optimal intervention in the presence of arbitrary wage rigidities that concluded that some degree of subsidisation of the declining industry is warranted on efficiency grounds. His bargaining model generates wage stickiness and inefficiently *low* levels of inter-sectoral labour transfer. Optimal intervention in this case entails supporting expanding rather than declining sectors.

[3] There are of course special cases, such as when workers are identical, where the equilibrium wage will equal the outside option for workers in a competitive labour market. In this instance TAA to unemployed displaced workers will price affected workers out of the market and certainly cause displacement. In imperfectly competitive labour markets the dependence of the equilibrium wage on the outside option is more fundamental and will be true in more general settings such as with worker heterogeneity.

the efficiency-wage shirking model and the bargaining model. Our results show that under both efficiency wage and bargaining model frameworks employment subsidies for displaced workers raise pre-displacement wages. In contrast, while a similar effect is found for subsidies to unemployed displaced workers in the bargaining model, whether such TAA will raise the pre-displacement wage of the unemployed under the efficiency wage framework will depend on the particular parameter values prevailing.

The remainder of the paper is organized as follows. In the following section we outline the basic structure of our framework. Section III then introduces wage setting under the shirking model and isolates the effect of employment and unemployment subsidies on pre-displacement wages. In Section IV we alternatively assume that firms bargain over wages within a matching/union model and similarly investigate how subsidies impact on pre-displacement. Concluding remarks are provided in the final section.

Section II: The General Framework

There are two periods, one and two. Workers who are displaced in the first period and acquire a job in the second receive a wage or employment subsidy. The intention is to model the temporary subsidisation of employment or unemployment of workers who are displaced as a consequence of trade liberalisation. We explore the issue in both a bargaining model and a shirking efficiency-wage model.

The expected utility of the state the worker is in equals: V_{KLM}^{i}. The i superscript is either n or s for non-shirking or shirking while the subscript K is either E for employed or

U for unemployed, an *L* subscript means the individual lost his or her job at the end of the first period (is displaced) and the subscript *M* is either 1 or 2 for the first or second period respectively. Workers discount second period utility by a factor ß. The timing of the model is as follows:

(1) The wage for period one (y_{E1}) is determined at the beginning of the period and firms choose the level of effort (x_1) which will imply a wage that is consistent with the worker's incentive not to shirk at that level of effort. Firms also choose employment. Some workers may be unemployed since the wage is above the competitive level if monitoring is imperfect. There may also be frictional unemployment.

(2) Employees either work or shirk, and firms supervise.

(3) At the end of period one there is an exogenous probability b that workers will be fired due to random negative shocks to firms. There is also a probability q that a shirking worker will be caught. If caught, they are fired. All those in employment receive the pre-displacement wage agreed upon at the beginning of period one while unemployed or fired workers receive the unemployment benefit (y_{U1}).

(4) All workers, including those fired or otherwise unemployed, apply for period two jobs.

(5) At the beginning of period two, firms choose the level of employment and unemployed workers get jobs with probability *e*. The wage y_{E2}, which will be paid at the end of the period, is set. TAA payments to eligible employed and unemployed workers are also made at the end of this period

(6) Employees either work or shirk, and employers supervise.

(7) At the end of the second period, non-shirkers and those not caught shirking are paid the wage. Workers who are caught shirking are fired and do not receive a wage. Those workers who lost their jobs in the previous period but found a new job at the beginning of the second period receive the wage plus an employment subsidy: (y_{EL2}+s_E). Unemployed workers who were also unemployed in the first period receive the unemployment benefit (y_{U2}), while those unemployed workers who became unemployed at the end of period one get higher benefits (y_{U2}). Workers who were employed in period one, continue to be employed at the beginning of period two and get fired for shirking in period two get: y^s_{U2}. This equals unemployment benefits (y_{U2}) plus some fraction e of the unemployment subsidy s_U. That is, given the discrete nature of the model it may be unreasonable to assume that workers who lose their job at the end of period one are displaced and qualify for full unemployment subsidies, while another worker who had been employed in period one but gets fired for shirking in period two (perhaps close to the beginning of the second period) gets unemployment benefits but no subsidy.[5] Finally, workers who lose their job at the end of period one, succeed in finding a new job (and thus qualify for employment subsidies) but get fired for shirking receive y^s_{UL2}. This equals y_{U2} plus some fraction a of the employment subsidy (s_E). Because of the discrete nature of the model,

[5] Workers displaced during the second period can be assumed to be displaced only at the end of the second period and thus receive the full second-period wage.

workers who are caught shirking get fired and do not receive any wage from the firm. Of course, in reality we would expect that such workers would have been working for part of the second period before being fired and to have benefited somewhat from the subsidy. For this reason we allow for the fraction of the employment subsidy that workers who are fired get to keep (alpha) to be positive.

To help clarify the payments received by a worker in each state we include two graphs in the Appendix. The first graph shows all the possible states and payoffs for a worker who is unemployed at the beginning of period one, while the second shows the possible states and payoffs for an initially employed worker.

Section III: Wage Setting under the Shirking Model

The best known shirking model of efficiency wages is arguably that of Shapiro and Stiglitz (1984). They look at a stationary equilibrium for infinitely lived agents. We look at a discrete time analogue of the model to analyse the impact of temporary subsidies.[6]

[6] Given that there are only two periods we might worry that the game is not incentive compatible since agents would cheat in the terminal period. Kandori (1992) shows in an overlapping generations game that incentive compatibility conditions can be sustained in this type of game if the current generation has knowledge on how previous generations played the game. This suggests intuitively at least that we could formulate the game in this paper with finitely lived agents and still satisfy incentive compatibility if we repeat the two period game in an overlapping generations framework.

We assume workers have full information and know all the parameters of the model, including the probability of shocks that might affect their employer. The first period serves to identify the workers eligible for TAA.

The expected utility of a non-shirker who is employed in period one is:

$$V_{E1}^{n} = y_{E1} - g(x_1) + bbV_{UL2} + (1-b)bV_{E2} \qquad (1)$$

This is the wage income less disutility of effort plus the expected utility of unemployment in the second period if the worker is displaced times the probability of displacement, plus the expected utility of employment in the second period times the probability of this outcome.[7] The expected utilities of employment and unemployment in period two will be defined below.

The expected utility of a shirker who is employed in the first period is:

$$V_{E1}^{s} = (1-q)y_{E1} + qy_{U1} + (1-b)(1-q)bV_{E2} + [1-(1-b)(1-q)]bV_{UL2} \qquad (2)$$

This is the wage times the probability of not being caught shirking, plus benefits times the probability of being caught, plus the probability of not being displaced in the first period *(1-b)(1-q)* times the expected utility of second period employment, plus the probability of being displaced times the expected utility of second period unemployment for a displaced worker.

The expected utility of an individual who is unemployed in the first period is:

$$V_{U1} = y_{U1} + bV_{U2} \qquad (3)$$

[7] When a worker in the first period anticipates the value of employment in the second period they anticipate the no-shirking condition will be satisfied in the second period . This determines the value of the job as will be seen below.

This is just benefits plus the expected present value of second period unemployment which is defined below. The expected utility of unemployment for a previously unemployed worker in the second period is:

$$V_{U2} = y_{U2}(1-e) + eV_{E2} \quad (4)$$

This is the discounted value of second period benefits times the probability the worker will not find a job at the beginning of the second period, plus the probability the worker will find a job times the discounted expected utility of a job for a non-displaced worker.

The expected utility of second period unemployment for a displaced worker is:

$$V_{UL2} = (y_{U2} + s_U)(1-e) + eV_{EL2} \quad (5)$$

This is the same as (4), though for a displaced worker.

The expected utility of not shirking in the second period for a worker who was unemployed in the first period but gets a job in the second is:

$$V_{EL2}^{n} = y_{EL2} + s_E - g(x_2) \quad (6)$$

This is just the value of the difference between earnings and the disutility of effort for a displaced worker in the second period.

The expected utility of shirking in the second period for a worker who was unemployed in the first period but gets a job in the second is:

$$V_{EL2}^{s} = (y_{EL2} + s_E)(1-q) + q(y_{U2} + as_E) \quad (7)$$

This is the wage for a previously displaced worker who gets a job in the second period times the probability of not being caught shirking times the value of benefits times the probability they will be caught.

The expected utility of not shirking in the second period for a worker who was employed in the first period and remains employed in the second is:

$$V_{E2}^{n} = y_{E2} - g(x_2) \tag{8}$$

This is the same as (6), though for a non-displaced worker.

The expected utility of shirking in the second period for a worker who was employed in the first period and remains employed in the second is:

$$V_{E2}^{s} = y_{E2}(1-q) + q(y_{U2} + es_U) \tag{9}$$

This is the same as (7) for a non-displaced worker except we assume that a worker who is fired for shirking gets to keep a fraction *e* of the additional benefits that displaced workers get. For the efficiency wage equilibrium we solve for the wage that satisfies the no-shirking condition for a second period workers: $V_{E2}^{n} = V_{E2}^{s}$.

$$y_{E2} = \frac{g(x_2)}{q} + y_{U2} + es_U \tag{10}$$

For displaced workers who get a job in the second period the no shirking condition and wage are : $V_{EL2}^{n} = V_{EL2}^{s}$

$$y_{EL2} = \frac{g(x_2)}{q} + y_{U2} - (1-a)s_E \tag{11}$$

A fraction (1-a) of employment subsidies will be passed onto employers in lower wages while displaced workers' wages increase by aS_E. This implies that displaced workers will be cheaper than others, raising the possibility that firms will fire other workers in order to hire subsidised displaced workers.[8]

From these equations we substitute the no-shirking conditions above into (6) and (8) to get the equilibrium expected utility of a second period job for non-displaced and displaced workers respectively, if the no-shirking condition holds with equality:

[8] For example Breen and Halpin (1989) find that only 20 percent of jobs under the employment incentive scheme in Ireland were additional. This scheme gave subsidies to firms who hired unemployed workers.

$$V_{E2} = [\frac{(1-q)}{q} g(x_2) + y_{U2} + es_U] \tag{12}$$

$$V_{EL2} = [\frac{(1-q)}{q} g(x_2) + y_{U2} - (1-a)s_E] \tag{13}$$

We substitute (12) and (13) into (1) and (2), i.e. we assume that the equilibrium holds in the second period, and substitute the equilibrium expected utility of a second period job into the equation for the expected utility of a first period job. This allows us solve for the no-shirking condition in the first period: $V_{E1}^n = V_{E1}^s$ as

$$\begin{aligned} &y_{E1} = \frac{g(x_1)}{q} + y_{U1} - (1-b)[V_{E2} - V_{UL2}] = \\ &\frac{g(x_1)}{q} + y_{U1} - (1-b)b\{(1-e)(1-q)\frac{g(x_2)}{q} + [(1-e)-e]s_U + aes_E\} \end{aligned} \tag{14}$$

We see that employment subsidies will raise the first period wage as long as they increase the second period wage in the case of displacement (a>0). One should also note that subsidies to unemployed displaced workers only increase the first period wage if the share of additional benefits displaced workers get to keep if fired for shirking (*e*) is low relative to the probability a displaced worker will not find a job (*1-e*). The reason for the ambiguous impact of subsidies to unemployed displaced workers is that, as we saw from (12), if *e* is large this increases the value of a second period job even for a worker who is not displaced at the end of the first period. This increases the expected value of non-shirking in the first period relative to shirking, and lowers the no-shirking wage. The subsidy also increases the value of unemployment for a displaced worker, which tends to increase the no-shirking wage.

Section IV: Wage Setting Under a Bargaining Model

The two most common applications of the bargaining model in the labour literature are to model unionised labour markets [see Booth (1995)] or to solve the wage in a matching model where there is a match-specific surplus when a worker and employer meet (Pissarides 2000). While the model analysed below is closer to the matching model in that we model a bargain between an individual worker and firm, it can also be applied to union wage models. For example Lindbeck and Snower (1991) assume workers bargain only over the wage, and justify the assumption in terms of a pure insider-outsider model where workers are unconcerned with the plight of outsiders. Oswald (1993) develops a model that further rationalises this assumption. In his model there is a first-in last-out rule for firing combined with a median voter who determines union elections. Unless there are very large adverse shocks, the median voter's job is secure and the union bargains only over wages and working conditions, while the firm chooses employment on the labour-demand curve. One should also note that whether the union cares about employment possibly depends on the institutional framework (see Booth, 1995, for a discussion) although in many cases it appears that unions accept the firm's right to manage when it comes to the choice of employment [see Oswald (1993) for anecdotal evidence on this point].

In this section we assume there is perfect monitoring so that workers never shirk, simplifying stages two and six in the timing of the model. The payoffs to workers are now just the payoffs to non-shirkers in the previous section. The value of a job in the second period is given by (6) and (8) for displaced and non-displaced workers respectively and the value of a first period job by (1). We amend the expected utility of

unemployment in each time period [given by (3), (4) and (5)]. The reason for this is that the motivation for the matching model analysed below is that there is some individual-specific surplus that will be lost to both parties if they fail to strike a bargain. It is therefore unreasonable to let the utility of an alternative job the worker may find with probability *e* have the same utility as the job that is bargained over. For this reason we get:

$$V_{U2} = y_{U2}(1-e) + e\overline{V_{E2}} \qquad (4')$$

$$V_{UL2} = (y_{UL2} + s_U)(1-e) + e\overline{V_{EL2}} \qquad (5')$$

The $\overline{V_{E2}} = (\overline{y_{E2}} - \overline{g(x_2)}$ and $\overline{V_{EL2}} = \overline{V_{E2}} + s_E$ terms are the exogenously given values of a typical alternative second-period job for a non-displaced or displaced worker respectively. We assume that worker's productivities in the two periods are p_1 and p_2 respectively. The firm maximises expected profits in each period:

$$p_1 = p_1 - y_{E1} \qquad (15)$$

$$p_2 = p_2 - y_{E2} \qquad (16)$$

While the above equations give profits for firms that stay in business we define $S \in (0,1)$ as a firm-level technology shock that is equal to one or zero. In each period there is a probability *b* that any firm will face a negative shock and be forced to shut down. The firm makes zero profit if it shuts down. As a first step to solving the bargaining problem we define the second period expected surplus from employment to workers who are respectively eligible and not eligible for TAA:

$$V_{E2} - V_{U2} = y_{E2} - g(x_2) - y_{U2}(1-e) - e\overline{V_{E2}} \qquad (17)$$

and:

$$V_{EL2} - V_{UL2} = y_{EL2} - g(x_2) - y_{U2}(1-e) + (s_E - s_U)(1-e) - e\overline{V_{E2}} \quad (18)$$

We note that unemployment and employment subsidies have the opposite affect. Employment subsidies increase the payoff to employment increasing the worker's surplus at any wage, while unemployment subsidies increase the value of the outside option and lower the employment surplus at a given wage. Firm and worker's bargaining power are given by ? and (1-?) respectively. The objective function for the second period Nash bargain for firm bargaining with displaced workers is the product of the firm's and the worker's surplus weighted by their bargaining power:

$$\Delta_1 = (p_2 - y_{EL2})^q [y_{EL2} - g(x_2) - y_{U2}(1-e) - e\overline{V_{E2}} + (s_E - s_U)(1-e)]^{(1-q)} \quad (19)$$

Taking first order conditions we can solve for the wage that solves the second period bargaining problem for a displaced worker:

$$y_{EL2} = p_2(1-q) + q[g(x_2) + e\overline{V_{E2}} + (y_{U2} + s_U - s_E)(1-e)] \quad (20)$$

The post-displacement bargained wage is increasing in the unemployment subsidy and decreasing in the employment subsidy. Of course since the employed worker receives the employment subsidy this is equivalent to saying that (1-e) of the employment subsidy is passed on to the firm in the form of lower wage costs while e of the employment subsidy goes into higher take-home pay. If we do the same for a non-displaced worker the wage is:

$$y_{E2} = p_2(1-q) + q[g(x_2) + e\overline{V_{E2}} + y_{U2}(1-e)] \quad (21)$$

We recognise that if workers fail to strike a bargain in the first period the match is dissolved and the second period surplus is lost to both players. In this event the firm gets nothing and the worker receives V_{U1} [given in equation (3)]. For this reason, in the first

period the firm will wish to maximise the discounted sum of expected surplus from the match over both periods:

$$\Pi = p_1 + bp_1 = p_1 - y_{E1} + b(1-b)(p_2 - y_{E2}) = \\ p_1 - y_{E1} + bq(1-b)[p_2 - g(x_2) - e\overline{V_{E2}} - y_{U1}(1-e)] \quad (22)$$

In the same way the worker enters the first-period bargain understanding that if they fail to reach a bargain the match will be dissolved and they will lose the expected second-period surplus. The worker's discounted sum of expected surplus is given by equation (1) where V_{UL2} is given by (5') and V_{E2} is given by substituting (21) into (8):

$$V_{E2} = \{[p_2 - g(x_2)](1-q) + q[g(x_2) + e\overline{V_{E2}} + y_{U2}(1-e)]\} \quad (23)$$

The expected present discounted sum of worker surplus in the first period is:

$$V_{E1} = y_{E1} - g(x_1) + b[bV_{UL2} + (1-b)V_{E2}] = \\ y_{E1} - g(x_1) + bb[(y_{U2} + s_U)(1-e) + e(\overline{V_{E2}} + s_E)] + bbV_{E2} \quad (24)$$

We note from (22) that neither the employment nor unemployment subsidy directly enters the firm's objective function. This is because the subsidies will only be paid when a worker is displaced, in which case the match will have dissolved and the second period will not matter to the firm.[9] We see from (23) and (24) that employment and unemployment subsidies increase the discounted future surplus from this match as we would expect. The Nash bargaining objective function can be written as:

$$\Delta_1 = \Pi^q [V_{E1} - V_{U1}]^{(1-q)} = \\ \{p_1 - y_{E1} + bq[p_2 - g(x_2) - e\overline{V_{E2}} - y_{U2}(1-e)]\}^q \{y_{E1} - g(x_1) - y_{U1} + \\ (1-b)b[V_{E2} - (y_{U2}(1-e) + e\overline{V_{E2}}] + bb[(1-e)s_U + es_E]\} = \\ (X - y_{E1})^q \{Y + bb[(1-e)s_U + es_E] + y_{E1}\}^{1-q} \quad (25)$$

[9] The subsidies will of course affect the firm's profit indirectly by lowering the equilibrium first period wage.

Looking at the simplified version in the last line in (25), we see that workers' surplus is increasing in both the employment and unemployment subsidies. Taking the first-order conditions and solving for the first-period wage we get:

$$y_{E1} = (1-q)X + q\{Y + bb[(1-e)s_U + es_E]\}$$

The first-period bargained wage is increasing in both the unemployment and employment subsidies.

V. Conclusion

We investigated how Trade Adjustment Assistance (TAA) affects pre-displacement wages in imperfectly competitive labour markets. Our results reveal that under both efficiency wage and bargaining frameworks employment subsidies for displaced workers raise pre-displacement wages. While the same is also true for subsidies to unemployed displaced workers in the bargaining model, in the efficiency wage model a subsidy to the unemployed only raises the pre-displacement no-shirking wage for some parameter values.

One should note, nevertheless, that if subsidies are given to workers across different firms, it may be more difficult for firms to discriminate across workers within the firm (i.e., between those who are and those who are not eligible for subsidies). First-period workers who are more likely to be eligible (if eligibility is based e.g. on age or tenure) would still have a higher efficiency/bargained wage, but whether this would be paid or not is unclear. Manning (2003, Chapter 5) presents evidence that firms tend to pay similar wages to workers within the firm, rather than setting wages individually. If this is

so, the fact that one or a small group of eligible workers has a higher outside option might manifest itself in their performance or in layoff probabilities rather than in higher wages.

While the predictions of the model are clear in terms of how the equilibrium efficiency/bargained wage of an individual worker is affected, how this would be expected to manifest itself empirically is unclear. While one might reasonably assume that the fraction of workers who are eligible for assistance is small enough to ignore general equilibrium affects, the eligibility criterion may be important. More precisely, if the criterion for a worker to receive assistance is based on the firm being deemed to be suitable for assistance (which would be a reasonable assumption for the US TAA scheme for example) this means that subsidies affect the firm's no-shirking condition for all its workers.[10] The model predicts that firms whose workers are more eligible for TAA would face higher wages costs and possibly higher chances of firm and worker displacement.

It becomes clear that empirical scrutiny of our results of the effect of TAA on the labour market would require fairly detailed data. In this regard one would arguably like to have a matched worker-firm micro-level data set that consists of an `experiment' group of firms that received TAA and a `control' group that did not, in order to isolate its impact. Creating such a sample could take the form of a random experiment and/or the data would need to be rich enough to take account of the obvious selection bias issues

[10] Of course if we were trying to evaluate the impact empirically this would raise the problem that the policy variable is endogenous. For example, more eligible firms would possibly have higher separation rates which affects the equilibrium wage.

involved in assessing the effect of TAA. As far as we aware, no such detailed data currently exist.[11]

[11] The paucity of appropriate data for supportive empirical evidence of the effect of TAA becomes obvious from the literature review provided by Baicker and Rehavi (2004). In their discussion of empirical evidence of its effects the authors are only able to resort to secondary evidence by referring to the literature on the impact of changes in unemployment insurance on the labour market. However, as they themselves note, "applying evidence from unemployed workers in general to workers receiving trade adjustment is problematic, since TAA workers have different employment and demographic profiles from the average unemployed worker" (p. 249).

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Appendix: Payoffs under each state.

Figure one depicts the payoffs to a worker initially unemployed in each state. Such a worker cannot be displaced at the end of the first period since they are already unemployed and so will be unaffected by the policy. The worker receives unemployment benefits at the end of the first period. Thereafter the worker may remain in unemployment (U) and receive benefits at the end of period two. Alternatively they may find a job (E) in which case they must decide whether to shirk (S) or not (N). A non-shirker receives the wage while a shirker either continues to be employed (E) and receives the wage or else gets caught shirking, is fired (U) and receives benefits.

Figure 1: Payoffs to an initially unemployed worker

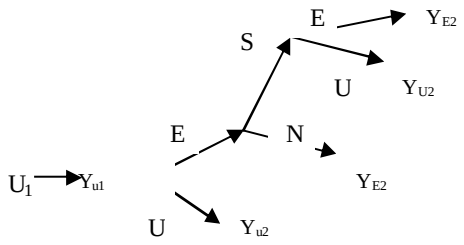

Figure 2 refers to an initially employed worker. It would be cumbersome to verbally detail every possible outcome, so we will detail one or two possible paths to illustrate how Figure 2 works. In period one an employed worker either shirks (S) or not (N). We will follow the path for a shirker who loses his or her job at the end of period one.

A shirker at the end of period one either gets fired and receives unemployment benefits, or, if laid off, receives the wage. We place both of these possibilities on one

branch of the tree below, since the subsequent possibilities for workers are the same regardless of why they were fired. If the worker does not find a job at the beginning of period two, they receive benefits plus the unemployment subsidy at the end of period two. If they find a job at the beginning of period two (E), they must decide whether to shirk (S) or not (N). Non-shirkers receive the wage plus employment subsidy. Shirkers who are not caught remain in employment and receive the wage plus employment subsidy. Workers who are caught shirking get fired and receive period-two benefits plus a fraction alpha of the employment subsidy.

Figure 2: Payoffs to an initially employed worker