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**John Maynard Keynes, Joan Robinson and the prospect theory approach
to money wage determination**

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Abstract

In the 1930s John Maynard Keynes and Joan Robinson observed a flex-fix sequence of money wage adjustment, which is changes in aggregate demand may initially change money wages but then money wages will settle at new levels even if unemployment is high. Their discussion of this pattern alluded to the importance of loss aversion in wage setting. This paper shows how loss aversion in wage setting can explain the flex-fix sequence of money wage behaviour in a way which is consistent with the observations and ideas of Keynes and Robinson.

Key words: wages; Keynes; Robinson; loss aversion

JEL classification: B22, E03, E24

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1. Introduction

John Maynard Keynes' (1936) assumption of a downward rigid money wage has a somewhat chequered status amongst economists. On the one hand, it is intuitively appealing and in some agreement with the downward nominal rigidity that is commonly observed.¹ On the other hand, mainstream economists sometimes dismiss it as "irrational". More importantly, its relevance when there is a secular increase in money wages is questionable.

Keynes justified his assumption of downward rigid money wages by arguing that workers would not accept cuts in their money wages relative to the wages of other workers. From today's perspective, a concern with relative wages calls to mind a concern with reference standards and a heightened concern with falling below other workers' wages calls to mind loss aversion. These are the two basic postulates of prospect theory, Kahneman and Tversky (1979). The link between Keynes' ideas on wage determination and prospect theory was developed by Bhaskar (1990), who incorporated loss aversion into the simple monopoly union model of wage bargaining.²

While Keynes assumed a downwardly rigid money wage for his macroeconomic analysis of depressed aggregate demand, his empirical observations of money wage behaviour were more complex.³ In *The General Theory*, Keynes (1936) reported observing what is called here a flex-fix sequence of money wages, whereby money wages may change in response to a change in aggregate demand (=flex) but will then settle at a new level (=fix). Keynes observation of the flex-fix

¹ Benigno and Fornaro (2015) and Chytilova (2018) provide many references that suggest the existence of downward nominal wage rigidities. Holden and Wulfsberg (2009) find stronger evidence for downward nominal wage rigidity than downward real wage rigidity.

² Earlier, before prospect theory, Trevithick (1975) had incorporated a concern for wage differentials into the labour supply function to explain the asymmetric behaviour of wages. Wood (1978) has an extensive discussion of the role of relativities in the determination of wages.

³ "...we shall assume that the money-wage and other factor costs are constant per unit of labour employed", Keynes (1936, p.27). Of course, in Chapter 19, Keynes showed how his aggregate demand analysis could be applied assuming a "flexible wage policy".

sequence is supported by the data. For example, at the time of developing and writing *The General Theory*, money wages, compared with 1929, fell by large amounts: by 9.1% in the UK by 1934; by 26.7% in the US by 1933; and by 20.8% in Australia by 1933. Following these large falls, in all three economies money wages stopped falling even although unemployment was extraordinarily high. However, while Keynes recognized the occurrence of a flex-fix sequence of money wage adjustment, his insights on wage determination did not go beyond a fixed money wage specification.

Keynes colleague, Joan Robinson, in a set of essays commenting on and extending ideas in *The General Theory*, Robinson (1937), concurred with and elaborated on the flex-fix sequence of money wages.⁴ However, she disagreed with Keynes' non-neoclassical explanation of money wage determination and put forward her own non-neoclassical explanation. Robinson replaced Keynes' emphasis on wage comparisons with other workers with an emphasis on the possibilities for wage increases and with wage comparisons with own past wages, saying that unions "demand a rise and resist a cut [in money wages] whenever they feel strong enough to do so", Robinson (1937, p.4).⁵ Again, a concern with a comparison and the asymmetry of this concern call to mind prospect theory.

"(D)emand a rise", which we will call Robinson's proactive postulate, can be interpreted through the lens of prospect theory, we argue here, as a theory of the determination of the reference wage. That is, "demand a rise" says that unions do not simply follow an exogenously-given reference money wage, but instead set the reference wage. By demanding a higher money wage they are raising their reference money wage. This gives strategic power to their money wage demand through the threat of loss aversion should their increased money wage demand fail. Their wish to avoid loss aversion increases the probability of a successful wage demand through increasing the determination of the union and its members to achieve the wage demand, through strengthening their cooperative spirit and increasing their willingness to stay the course.⁶

⁴ Boianovsky (2005) presents a detailed discussion of Robinson's (1937) analysis of the labour market with a focus on her definition of full employment and the involvement and concurrence of Keynes with her views in these essays.

⁵ Robinson (1937) was republished in 1948 with different pagination. Throughout this paper page references are for the 1937 edition.

⁶ As Barberis (2013) notes, a weakness of prospect theory is its lack of a theory of the determination of the reference point. Our use of Robinson's proactive postulate to determine the reference wage is a way extending prospect theory to cover this weakness. Koszegi and Rabin (2006) and Heidhues and Koszegi (2008) have developed a rational expectations approach to setting the reference point.

This paper develops the prospect theory interpretation of the ideas of Keynes and Robinson about wage determination. To explain the upward flex part of the flex-fix sequence of money wages, the paper extends Bhaskar's approach to incorporate Robinson's proactive postulate. This extension also reconciles a downwardly rigid money wage with an upward adjustment with inflation, which is a considerable advance over Keynes' approach.

For the downward flex part of the flex-fix sequence of money wages, Robinson, like Keynes, did not put forward an explanation. Given the substantial downward movements in money wages in the 1930s, this is a short-coming of their theorising, albeit understandable given the over-riding importance of developing and publishing the theory of how aggregate demand determines the actual level of activity. It is shown in this paper that the widely-accepted idea that when firms get into extreme duress their workers may accept wage cuts, see eg Akerlof, Dickens and Perry (1996), Bewley (1999), can be incorporated into the prospect theory approach.

The prospect theory model of wage determination developed here using the ideas of Keynes and Robinson supports the major proposition of Keynesian economics: that changes in the level of nominal aggregate demand can have persistent effects on the rate of unemployment, see Bhaskar (1990), McDonald and Sibly (2001), (2005). In agreement with Keynes and Robinson, this property of the model implies that money wages have no tendency to return to a level consistent with full employment level given the nominal level of aggregate demand. Instead, barring shocks to nominal aggregate demand, loss aversion will tend to reinforce the wage level inherited from the past.⁷ Whether one labels loss aversion as irrational or not, its effect does not wear out with the passage of time. It is not temporary. This implies the possibility of persistent unemployment caused by a persistent deficiency of aggregate demand. Thus, Robinson's conclusion that "(I)t is thus impossible to argue that there is any self-righting mechanism in the economic system which makes the existence of unemployment impossible, even in the longest of runs.", Robinson (1937, p.121) is supported by the prospect theory model.

Given that prospect theory did not exist in the 1930s, the closeness of the ideas of Keynes and Robinson to prospect theory was prescient. While they did express scepticism about the value of applying psychological concepts to economics, this

⁷ This follows the status quo theory of the reference wage, see eg Kahneman, Knetsch and Thaler (1991), Kahneman (2003b).

scepticism was based on their view that the state of psychology *at that time* was inadequate. Thus, it is not unreasonable to imagine that they would have been sympathetic to prospect theory, had it existed, as the theoretical basis of wage determination that addressed their dissatisfaction with the narrow psychological base of the neoclassical model of human nature.

The natural rate revolution of 1968 eschewed the psychological intuitions of Keynes and Robinson on the determination of money wages, and instead adopted a conventional demand and supply framework. Worker resistance to money wage cuts was ruled out. Excess supply of labour would reduce money wages relative to expectations, causing a decreasing rate of inflation for as long as the excess supply persists. There is no flex-fix sequence, only flex, albeit slow flex in the contract models of wage agreements of New Keynesian theory.⁸

The explicit rejection by natural rate theorists of the idea that workers resist wage cuts and this resistance may be related to psychology is, to use the language of Bruni and Sugden (2007), an example of ‘the road not taken’. Bruni and Sugden (2007, p.146) argue that “(B)efore Pareto’s reformulation, neoclassical economics was based on theoretical and experimental psychology” but this road was abandoned in the 1930s and 1940s when the elimination of psychological concepts from economic theory was completed. For the theory of wage determination used in macroeconomics, the road with psychological concepts was abandoned with the natural rate revolution.⁹

The paper has 5 sections. Section 2 documents the observation of Keynes and Robinson of a flex-fix sequence of money wage behaviour and describes their insights on the determination of money wages. Section 3 uses Bhaskar’s prospect theory model of wage determination to interpret the insights of Keynes and Robinson. Section 4 shows how the Bhaskar model can be extended to explain the upward flex part of the flex-fix sequence of wage behaviour using Robinson’s proactive postulate

⁸ Eggertsson (2008) recognised the challenge of explaining the flex-fix sequence. His solution within a neoclassical model was focused on the US in the 1930s. He argued that a special event, the policy switch from Hoover to Roosevelt in 1933, stopped the deflation. Thus, Eggertsson proposed that “Roosevelt’s inauguration turned the persistent deflation in the wholesale and the consumer price indexes from 1929 to March 1933 into modest inflation from March 1933 to 1937”, Eggertsson (2008, p.1477). However, Roosevelt’s inauguration cannot explain the numerous other instances of a flex-fix sequence, in other countries and at other times.

⁹ As James Forder (2014) put it, in his detailed study of the history of the Phillips curve, Friedman and Phelps “narrowed the scope” of thinking about wage determination, Forder (2014, p.87).

and to explain the downward part using the threat to firms of extreme duress. Section 5 concludes the paper.

2 Keynes, Robinson and the flex-fix sequence of money wages

2.1 The empirical evidence on the flex-fix sequence of money wages at the time of Keynes' General Theory

The flex-fix sequence of money wage adjustment observed by Keynes and Robinson, see Section 2.2, is apparent in data on money wages and unemployment from the great depression of the 1930s for the UK and other high-income countries. It is also apparent in UK data going back to 1861.

Consider Figure 1, in which wage inflation and unemployment for Australia, UK and US are plotted for the years 1929 to 1938. (Price inflation yields a similar story). For each of these economies, the initial impact of the 1930s depression was to decrease money wages, a flex-wage response. Thus in 1931 wage inflation is negative in each of these economies, less negative for the UK, but still negative. This evidence is in clear contradiction of a downwardly-fixed nominal money wage.

However, the initial wage decrease is followed, after 1931/1932, by 'fix' money wage behaviour. That is, it can be seen in all three economies that inflation stopped decreasing in 1931/1932 and returned to non-negative rates even although unemployment remained high.

Figure 1 about here

A similar sequence, that is, flex followed by fix, is shown for price inflation for the 1930s for all 12 countries for which data is reported in Maddison (1991), see McDonald (1995).

The flex-fix sequence of money wages in the 1930s experience was not new. It is evident in the wage data for the UK for the period 1861 to 1913 used by Phillips (1958) to estimate the Phillips curve, shown in Figure 1. The flat section at high rates of unemployment is consistent with fix-wage behaviour because it shows little or no impact on inflation of high rates of unemployment. Phillips also found that the rate of inflation was positively related to changes in the rate of unemployment, a relation

subsequently called the Phillips loops and now often referred to as the speed-limit effect. The loops or speed-limits are the “flex” part of the flex-fix sequence.¹⁰

2.2 Keynes’ and Robinson’s empirical observations of the flex-fix sequence of money wages at high rates of unemployment

At high rates of unemployment, an initial disturbance was seen by Keynes to cause changes in money wages and prices, that is flex. He suggested that “an increasing effective demand tends to raise money-wages though not fully in proportion to the rise in the price of wage-goods; and similarly in the case of a decreasing effective demand”, Keynes (1936, p. 301), and also that “labour [is] readier to accept wages cuts when employment is falling off”, Keynes (1936, p.10).¹¹ However, this adjustment was seen by Keynes as short-lived. Keynes said that at high rates of unemployment, prices, and thus wages, “in response to an initiating cause of disturbance, seem to be able to find a level at which they can remain, for the time being, moderately stable”, Keynes (1936, p.250). Thus, Keynes was observing the sequence of flex followed by fix, albeit with some qualification on just how permanent the “fix” will be.¹²

Keynes contrasted this behaviour with the flex-wage behaviour of neoclassical theory, using the expression “fall without limit” to describe neoclassical flex-wage behaviour when the economy is at less than full employment, see eg Keynes (1936, p.253 and pp.303-4). Keynes regarded the neoclassical mechanism of wage behaviour, “fall without limit”, as empirically irrelevant for an economy at less than full employment. Note that the decelerationist property of natural rate theory means “fall without limit”.

¹⁰ In its first-derivative form, the flex-fix sequence is where the rate of inflation may be changed by a change in activity but subsequently settles at a positive rate, see, for example, econometric studies of the inflation-unemployment relation for the US and Australia; see Barnes and Olivei (2003), Driscoll and Holden (2004), Lye, McDonald and Sibly (2001) and Lye and McDonald (2006), (2008). These papers test for a flat section in the short-run Phillips curve (SRPC) by specifying a piece-wise linear SRPC. They find that an SRPC with a horizontal section dominates econometrically the non-existence of a horizontal section, thereby finding fix. Flex, aka the speed limit effect, is not found in all these papers.

¹¹ Keynes (1936, p.9) implicitly noted downward-flex in wage behaviour in the US in saying: “It is not very plausible to assert that unemployment in the United States in 1932 was due ... to labour obstinately refusing to accept a reduction of money wages”.

¹² Thus, Keynes did not commit himself to the proposition that money wages remain at this stable level for all time. Provided money wages remain stable for a substantial period of time, the “fall without limit” of neoclassical economics will be irrelevant for practical purposes. As Keynes famously observed earlier, “*In the long run we are all dead*”, Keynes (1923, p.80, original emphasis).

In *The General Theory* there is a tension between the formal model and the discussion of the empirical sequence of wage behaviour. As noted above, in the model, the money wage is assumed to be fixed even if unemployment increases. However, in the empirical discussion it is clear that Keynes regarded as realistic a flex-fix sequence in which money wages will fall *with limit* if aggregate demand contracts below the full employment level. It seems reasonable to infer that Keynes was prepared to use an oversimplified model, that is a model with fix-wage rather than a flex-fix wage sequence, as the basis for his revolutionary analysis of aggregate demand.¹³ The importance, and urgency, of replacing the analysis of unemployment based on the flex-wage neoclassical model with an aggregate demand approach was overwhelming. Keynes discussion in chapter 19, “Changes in Money-Wages”, defends the essential message of his analysis of aggregate demand, that is, a contraction in nominal aggregate demand would cause a long-lasting increase in unemployment, even if money wages were assumed to follow a flex-fix sequence. After all, under flex-fix money wages settle and so the fix-wage assumption of the *The General Theory* eventually dominates.¹⁴

Robinson (1937, p.3) agreed with Keynes on the flex-fix sequence of wage behavior. At high rates of unemployment Robinson said that the “assumption of perfectly plastic money wages is highly unrealistic” and thought that, echoing Keynes’ terminology, “a community in which money wages fall without limit so long as unemployment exists is very unlike the real world”, Robinson (1937, p.122). In discussing a depressed economy, Robinson (1937, p.120) talks of the money wage reaching “a point below which it can fall no further”. Also, in line with Keynes, she allowed for a temporary flex sequence in money wages at high unemployment, saying “(A)n increase in effective demand...will be favourable ...to a rise in money wages”, Robinson (1937, p.3), and that “movements in the level of employment are the chief influence determining movements in the level of money wages”, Robinson (1937, p.7).

¹³ Keynes (1936, p.257) acknowledged that “(I)t would have been an advantage if the effects of a change in money-wages could have been discussed in an earlier chapter”. He then considered the macroeconomic effects of a “flexible wage policy”. His focus was to attack the argument that, from a position of high unemployment, neoclassical money-wage flexibility could generate a full-employment outcome.

¹⁴ Note that with an explicit flex-fix adjustment, the analysis of chapter 19 implies that the flex component may make the final outcome worse, increasing the seriousness of Keynes’ message.

2.3 Keynes, Robinson and the determination of money wages

In their discussion of the determination of money wages, both Keynes and Robinson emphasised the role of ideas that today would be considered as central to prospect theory. However, as will be seen, they both thought that at their time of writing in the 1930s, these ideas were not capable of systematic application, given the state at the time of the discipline of social psychology.

Keynes pointed out that trade unions bargained in terms of money wages and had little influence on real wages. He contended that workers would resist a reduction in their money wage because they would see such a reduction as a reduction relative to the wages of other workers. This contention is a famous expression of the importance of context in economics and is reasonably viewed as a pre-cursor of the current emphasis on context in behavioural economics and prospect theory. Keynes (1936, p.14) said “(A)ny individual or group of individuals, who consent to a reduction of money wages relatively to others, will suffer a relative reduction in real wages, which is sufficient justification for them to resist”. On this basis, Keynes (1936, p.15) asserted that “Every trade union will put up some resistance to a cut in money wages, however small”.

Robinson (1937, pp.4-5) agreed with Keynes in saying that trade unions “can only deal in ... money wages” and that they will be very suspicious of a suggestion to cut money wages. However, she rejected Keynes’s theory of relative wage rigidity because it offered “an interpretation of trade union psychology which is both dubious and unnecessarily complicated”. She offered her own theory, which she described as “simpler”.

Robinson based her theory of wage determination on the postulate that the business of trade unions is “to secure the best terms they can for their members and [referring back to her *Economics of Imperfect Competition*, Robinson (1933)] to prevent employers from taking advantage of their monopsonistic position vis-a-vis the workers”, Robinson (1937, p.5). In pursuing this aim, unions “demand a rise, and resist a cut [in money wages], whenever they feel strong enough to do so”, Robinson (1937, p.4). The asymmetry in union attitudes, that is, “demand a rise and resist a

cut”, suggests loss aversion, with the reference wage being the own-wage, rather than the wage of other workers.¹⁵

Note that the active/passive contrast between Robinson and Keynes. According to Robinson’s proactive postulate, unions are looking for opportunities to increase money wages, that is, for “a favourable situation”, Robinson (1937, p.5), not waiting passively for average wages to rise, as in Keynes.

Note also that by shifting from Keynes’ idea of comparisons with other workers to comparisons with own existing wages, Robinson did not accept the social dimension, an important dimension of behavioural economics.

Robinson discussed a number of factors that influence trade union wage demands. For ease of exposition, group these factors into three groups:

union organisation, see Robinson (1937, p.39), and also including the financial resources at the union’s disposal, see Robinson (1937, pp 5-6, 7, 8-9), loyalty, see Robinson (1937, p.10) and indignation which “cements the bonds of Trade Union organisation”, see Robinson (1937, p.6);

competition from outsiders, including competition from non-union labour, see Robinson (1937, pp.7, 8-9, 13);

profits, see Robinson (1937, p.13).¹⁶

Robinson (1937, pp.6-7) argued that these factors tend to increase union power and thus wage demands at higher employment levels.

From her discussion of wage determination, Robinson put forward a relation between wage inflation and aggregate employment that had four sections. Within a neutral range between upper and lower critical levels of employment, money wages would tend to be constant if the level of employment was constant, Robinson (1937, p.7). There would be fix in the level of money wages. The critical levels of employment are determined by “conditions of the labour market”, Robinson (1937, p.7), that is imperfect competition, trade union activity and labour mobility. For

¹⁵ It is true that at one point Robinson emphasised a lack of knowledge as the source of resistance to wage cuts saying that “In any actual situation the effect upon employment of a change in money wages is obscure and difficult to diagnose, and the suggestion that a cut in wages will do them good is naturally regarded by the Trade Unions with the utmost suspicion”, Robinson (1937, pp. 4-5). But note that this is not inconsistent with the loss-aversion story.

¹⁶ The positive influence of profits on wages found in empirical investigations such as Krueger and Summers (1988) supports Robinson’s theory. Many scholars have put forward this relation, see Forder (2014). Robinson’s Cambridge colleague, Kaldor (1959) argued strongly for this influence. In the behavioural economics literature Akerlof (1984) and Thaler (1989) emphasise the influence of profits on wages.

employment levels above the upper critical level but below full employment “there will be a progressive rise in wages with a constant level of employment”, Robinson (1937, p.8), such that the higher is the level of employment, the greater is the rate of wage inflation. For convenience, we will label this region the inflation zone.¹⁷ Note that a sustained level of employment at any particular level within the inflation zone would not cause increasing inflation. There is fix in the rate of wage inflation.

The third section is the upper limit of the inflation zone, called “full employment” by Robinson. If the monetary authorities attempt to sustain a level of employment above full employment then “the rate of rise in money wages will accelerate as time goes by” due to the upward revision of inflationary expectations and so “[I]n the limit if expectations are revised instantaneously money wages must rise indefinitely fast”, Robinson (1937, p.20). Thus, money wages can rise without limit, as in neoclassical theory.

Turning to the lower critical level of employment, Robinson (1937, p.7) says “money wages fall”. This is suggestive of a deflation zone to parallel the inflation zone, which would be our fourth section.¹⁸ However, as the discussion above shows, a persistently negative rate of wage inflation is not an accurate description of Robinson's considered view. Indeed, in Robinson's view, the human antipathy to falling money wages was strong enough not to require trade union organisation to be carried out. While most of her discussion of wage determination centres on trade union decision-making, she regards the assumption of perfectly plastic money wages as highly unrealistic for “even the pre-trade union world”, Robinson (1937, p.122), and cites the view of Dr Johnson from the days before trade unions, in 1773 in fact, as supporting evidence, Robinson (1937, p.122, fn. 1).

In view of this I suggest that for practical purposes Robinson did not place much importance on the deflation zone.

The discussions of Keynes and Robinson on the inflation-employment relation differ markedly from natural rate theory in having an asymmetry – for employment rates below the full employment level inflation tends to be constant, zero in the case of Keynes and containing a region with a positive relation to employment in the case

¹⁷ Keynes (1936, p.301) postulated something like Robinson's inflation zone in saying that “the wage-unit may tend to rise before full employment is reached”.

¹⁸ On p.10 Robinson (1937) essentially repeats this point, saying that “under conditions of perfect competition with no labour organisation and perfect mobility” money wages will be falling if any unemployment exists.

of Robinson, while above the full employment level inflation will spiral up. Thus, they did not dispute, using modern terminology, the accelerationist hypothesis. Indeed, Robinson set it out in detail.¹⁹ What they did dispute by using language such as ruling out “fall without limit”, was its symmetric converse, the decelerationist hypothesis, which is the tendency for inflation to be decreasing at high rates of unemployment.

2.4 Keynes and Robinson foreshadowed a behavioural economics approach ²⁰

While Keynes alluded to the influence of the “psychology of the workers” Keynes (1936, p.301), he drew back from further analysis, saying that such considerations “do not readily lend themselves to theoretical generalisations”, Keynes (1936, p.302).

In her theoretical discussion of trade union wage policy, Robinson (1937) mentioned concepts of “indignation” by workers, p. 6., the “moral position of trade unions”, p.7, and “loyalty”, p. 10 which are not neoclassical but are consistent with behavioural economics.²¹

Robinson’s open mind to behavioural economics is also suggested in her chapter on “Indeterminacy”, Robinson (1937, pp.231-5).²² Here, Robinson put forward a dichotomous approach to economic analysis by drawing a distinction between economic and non-economic factors. In Robinson’s definition, indeterminacy for economists arises when economic factors are insufficient to determine a unique solution. Robinson included “human error or sentimentality” in her list of non-economic factors. These factors, she argued, “cannot be easily fitted into the existing structure of pure economic analysis”, Robinson (1937, p.231), and suggested that “the economist must wait for the development of a science of social psychology to supplement his own methods of analysis”, Robinson (1937, p.232).

¹⁹ A point which Phelps (1970) ignored, even though he cited Robinson (1937).

²⁰ This section includes some material from McDonald (2012).

²¹ The emotional nature of these considerations is perhaps partly behind her claim that “It is idle to attempt to reduce such questions as Trade Union policy to a cut and dried scheme of formal analysis”, Robinson (1937, p.7). She did think that judgements could be made “in a more general way” about wage determination, Robinson (1937, p.7), ie, not made according to a cut and dried scheme.

²² See also Robinson (1964, pp.50-1) where Robinson sets out a list of would later be behavioural-economics factors that she regards as influencing tastes, which are the influence of society, of habit and of the desire for change, and challenges the idea that all preferences should be respected, eg “drug-fiends should be cured”.

Given that in making these judgements she referred to the “existing” structure of economic analysis and that she entertained the possibility of future developments in social psychology, Robinson did not close the door on a broader analysis being developed in the future. Indeed, ‘must wait’ suggests that these developments should be accepted by economists if they occur.

Robinson labelled her method of dealing with the absence of a formal analysis of social psychology as the indeterminacy method, as illustrated by the following statement on economic method:

“It is a great merit of the General Theory of Employment that it allows us to believe that the general level of prices is determined very largely by arbitrary human decisions, and saves our self-respect by leaving us such problems as the determination of the level of real wages and the amount of employment to be discussed by the methods of pure economic analysis”, Robinson (1937, pp.235).

Robinson’s indeterminacy method postulates that the determination of crucial magnitudes, in particular money wages, are outside of economic theory.²³ However, given the advances in behavioural economics and bargaining theory that have occurred since 1936, and indeed since 1968, Robinson’s dichotomy can now be replaced, or at least modified, by using analysis from prospect theory and bargaining theory to determine money wages.²⁴

3 Keynes and Robinson through the lens of prospect theory

3.1 Loss aversion and wages

Kahneman (2003a, p. 165) linked workers’ strong dislike of wage cuts to loss aversion, saying “The rules of fairness that embody a regard for loss-aversion also induce stickiness in markets. For example, cutting the wage of an employee is considered unfair even when the employee could easily be replaced at a lower pay”, Kahneman (2003a, p. 165). The existence of loss aversion was based on evidence from psychological research. From this evidence, Kahneman and Tversky (1979)

²³ Robinson was not alone. Forder (2014, p.28) observes that the idea of an indeterminacy in wage bargaining “appears again and again in the literature”.

²⁴ A “cut and dried” analysis of money wage and price determination remained off-limits for Robinson over the subsequent decades, see, for example, her essay on stagflation, Robinson (1980, ch.3).

argued that human decision making is determined by comparing outcomes with reference levels and that that outcomes below the reference level will cause the strong feeling of loss aversion. That is, there is an asymmetry in feelings about losses compared to gains. The canonical ratio is 2:1, that is losses are felt twice as keenly as gains, see Tversky and Kahneman (1991). Kahneman and Tversky (1979) argued that this evidence can be captured by a value function relating value to outcomes relative to the reference level. To capture loss aversion, the value function is kinked at the reference point.²⁵ Tversky and Kahneman (1986) describe the value function as being “unabashedly descriptive and in making no normative claims”.²⁶

Applying prospect theory to Keynes’ views, the reference level is the wage of other workers. The ‘however small’ in Keynes (1936, p.15) assertion about trade union attitudes to cuts in money wages, cited above, implies, as noted in McDonald (2010), a discontinuity in the marginal value of relative wages at the current level of the wage, which is precisely the implication of loss aversion as applied to wage determination.

This paper puts forward a further link between loss aversion and the ideas of Keynes and Robinson on wage determination. A trade union in putting up “resistance to a cut in money wages” will get some strategic value from loss aversion. For example, the rallying call of the Miners Federation of Great Britain in 1925 “Not a penny off the pay, not a minute on the day” drew a line in the sand, adding saliency and focus to the reference wage, seen as the wage demand, and so contributing to trade union strategy. By being a focal point for the workers, “indignation” over the possibility of a shortfall of the actual wage from the reference wage may enhance the cooperative spirit among union members, thereby enhancing further the strategic value of the reference wage, that is, in Robinson’s words, indignation “cements the bonds of Trade Union organisation”, see Robinson (1937, p.6). Indeed, the emotional impact of the salient target wage may induce a substantial feeling of unfair loss from an incursion and may thereby increase the loss aversion parameter.

²⁵ Kahneman and Tversky also postulated a diminishing sensitivity of feeling the further is the outcome from the reference point. We do not include diminishing sensitivity in the discussion in this paper.

²⁶ In contrast, Koszegi and Rabin (2006, p.1134) link the value function directly to the neoclassical approach by specifying an additive form combining intrinsic utility, which “corresponds to the outcome-based utility classically studied in economics”, with gain-loss utility, which measures “the sensation of gain or loss due to departures from the reference point”. They base their specification of gain-loss utility on intrinsic utility, saying that it “seems closely related to the consumption value of the goods in question”. The prospect theory explanation for the flex-fix sequence of wage determination goes through under either specification of the value function

3.2 The Bhaskar model

Bhaskar (1990) showed how the integration of prospect theory, and especially the concept of loss aversion, into a model of trade union wage setting, the simple monopoly union model, see McDonald and Solow (1981), can explain resistance to wage cuts.

3.2.1 The microeconomics of wage setting in the Bhaskar model

To apply prospect theory to wage determination by trade unions, Bhaskar (1990), following Keynes' formulation, introduced a concern by workers about their money wage relative to the expected money wage received by other workers. The latter was the reference wage. The concern about a wage less than the reference wage was amplified by loss aversion.

Thus, Bhaskar (1990) specified the worker's value function using constant elasticity functional forms as:

$$\left\{ \begin{array}{l} U^+ = W^{\beta_1} \left(W / W^{\text{REF}} \right)^{\beta_2^+} \text{ for } W \geq W^{\text{REF}} \\ U^- = W^{\beta_1} \left(W / W^{\text{REF}} \right)^{\beta_2^-} \text{ for } W < W^{\text{REF}} \\ U^{\text{RES}} = \left(W^{\text{RES}} \right)^{\beta_1} \end{array} \right\} \text{ with } 0 < \beta_1 < 1 \text{ and } 0 < \beta_2^+ < \beta_2^- < 1 \quad (1)$$

where W , W^{REF} and W^{RES} are the (money) wage, reference wage and reservation wage respectively. The reservation wage is the income flow for workers who fail to get employment at the firm after the bargain comes into effect. It is influenced by labour market conditions, such as the aggregate rate of unemployment. Loss aversion is captured by $\beta_2^+ < \beta_2^-$.

In the Bhaskar model, workers are represented by a union whose objective is simply the sum of the value for those members who are employed at the firm after the wage bargain comes into effect and those members who fail to gain employment:

$$\Gamma = LU^i + (N - L)U^{\text{RES}} \text{ for } i = \{+, -\} \text{ as } W \geq W^{\text{REF}} \text{ or } W < W^{\text{REF}} \quad (2)$$

Bhaskar assumes the wage-employment outcome is the point on the labour demand curve which maximises the union's objective function, that is, the outcome on the highest indifference curve. Differentiation of the union's objective function gives the slope of the indifference curves as

$$\left. \frac{dW}{dL} \right|_{IC}^i = - \frac{W \left[\left(\frac{W}{W^{REF}} \right)^{\beta_2^i} - \left(\frac{W^{RES}}{W} \right)^{\beta_1} \right]}{L \left[(\beta_1 + \beta_2^i) \left(\frac{W}{W^{REF}} \right)^{\beta_2^i} \right]} \text{ for } i = \{+, -\} \text{ as } W \geq W^{REF} \text{ or } W < W^{REF} \quad (3)$$

As can be seen from these derivatives, loss aversion, that is $\beta_2^+ < \beta_2^-$, implies that the indifference curves have a kink at the wage equal to the reference wage. Around the kink, the indifference curve is flatter for a wage reduction than it is for a wage increase because a wage reduction relative to the reference wage causes loss aversion and so requires a greater compensation in terms of additional employment.

Given the kink in the union's indifference curves, the union's wage demand has to satisfy the following inequality

$$\left. \frac{dW}{dL} \right|_{IC}^- \geq \left. \frac{dW}{dL} \right|_{LD} \geq \left. \frac{dW}{dL} \right|_{IC}^+ \quad (4)$$

where $\left. \frac{dW}{dL} \right|_{LD}$ is the slope of the labour demand curve.

Within limits determined by the inequality (4), the union's wage demand will be determined by the reference wage. This result can be used to interpret Keynes by identifying the reference wage with the wage of other workers. It adds to Keynes by positing the power of loss aversion to support the resistance of unions to a wage cut, that is by the desire to avoid the disutility that would be caused by a wage outcome below the wage of other workers. For Robinson, it is a bit more complicated. The reference wage is either the inherited wage or, if it exists, an alternative which is seen to offer better terms for the union's members. The more complicated theory of the reference wage that follows from Robinson's analysis is explored below.

3.2.2 The macroeconomics of the range of equilibria in the Bhaskar model

In this subsection, making the usual assumptions for macroeconomic closure, a range of equilibria unemployment rates is derived from the microeconomic analysis above.

To derive the range of equilibria, it is convenient for our purpose here to keep to the constant elasticity functional forms by specifying the firm's production function as $Y = AL^\alpha$ and the firm's revenue function as $PY = C\bar{P}Y^{1-h}$ with $0 < h < 1$, where h =elasticity of demand with respect to price, C =demand shift factor for the firm and $\bar{P}$ =aggregate price level.²⁷ This gives the firm's labour demand curve as

$W = \alpha(1-h)C\bar{P}A^{1-h}L^{\alpha(1-h)-1}$ with a slope given by

$$\left. \frac{dW}{dL} \right|_{LD} = [\alpha(1-h)-1] \frac{W}{L} \quad (5)$$

In macroeconomic equilibrium, $W=W^{REF}$, $W^A=W$ and $P=\bar{P}$. $W=W^{REF}$ implies by (3), (4) and (5) that the wage limits $\{W^+ = k^+ \times W^{RES}, W^- = k^- \times W^{RES}\}$ are markups of $\{k^+, k^-\}$ on the reservation wage, with

$$k^i = \left\{ 1 - [1 - \alpha(1-h)](\beta_1 + \beta_2^i) \right\}^{-\frac{1}{\beta_1}} \text{ for } i=\{+, -\}. \quad (6)$$

$\beta_2^+ < \beta_2^-$ implies $k^+ < k^-$. The reservation wage is conveniently modelled to depend positively on: the probability of alternative employment, ρ ; the wage in alternative employment, W^A ; and income received while unemployed, B , which includes unemployment benefits, earnings from casual work and the monetary value of any home production. Thus, the reservation wage is determined by

$W^{RES} = \rho W^A + (1-\rho)B$. Assuming B is proportional to W by $B=bW$, the expression

for W^{RES} reduces to $\frac{W}{W^{RES}} = \frac{1}{\rho(1-b) + b}$ and so in macroeconomic equilibrium use

of $W^i = k^i W^{RES}$ implies

²⁷ $C\bar{P}$ is proportional to nominal aggregate income=nominal aggregate demand. An x % increase in $C\bar{P}$ will increase C by x % if $\bar{P}$ is fixed. If all prices increase by the same percentage as nominal aggregate demand then $\bar{P}$ increases by x % and C is unchanged.

$$\rho^i = \frac{\frac{1}{k^i} - b}{1 - b} \text{ for } i = \{+, -\} \quad (7)$$

with $\rho^i \leq 1$ as $k^i \geq 1$. To save on notation assume the number of firms is equal to one, so that L denotes both employment at the firm and aggregate employment. Relating the probability of alternative employment, ρ , with aggregate labour market conditions through $\rho = \frac{L}{L^S(V)}$, where $L^S = L^S(V)$ is the aggregate labour supply curve (the dependence of labour supply on only V rules out for convenience the discouraged worker effect) and V is the real wage, and noting that $k^- > k^+ \rightarrow \rho^- < \rho^+$, the limits of the range of equilibria are constant multiples of the labour supply curve where the multiples are determined by the parameters of the model, as given by

$$\frac{L^+}{L^S(V)} = \frac{L^{\text{MAX}}}{L^S(V)} = \frac{\frac{1}{k^+} - b}{1 - b} > \frac{L^-}{L^S(V)} = \frac{L^{\text{MIN}}}{L^S(V)} = \frac{\frac{1}{k^-} - b}{1 - b} \quad (8)$$

Note that if unions had no power and so $k^i = 1$ for $i = \{+, -\}$ then $L^{\text{MIN}}, L^{\text{MAX}}$ and the labour supply curve would coincide.

$P = \bar{P}$ implies the aggregate labour demand curve is given by

$$V = \alpha(1 - h)AL^{\alpha-1} \quad (9)$$

Figure 2 shows the pattern of aggregate labour market outcomes of the Bhaskar model as given by (8) and (9). Any point on the labour demand curve between L^{MIN} and L^{MAX} is a possible macroeconomic equilibrium. For it to be an actual equilibrium position, the real wage rate would have to be equal to the real reference wage and the level of aggregate demand would have to be equal to the level of output produced by that level of employment. For employment levels outside the range L^{MIN} to L^{MAX} , inflation will be increasing for $L > L^{\text{MAX}}$ and decreasing for $L < L^{\text{MIN}}$.^{28, 29}

²⁸ Although it could be argued that loss aversion will damp somewhat the downward dynamic on money wages if $L < L^{\text{MIN}}$.

²⁹ Figure 2 shows that the Bhaskar model implies a counter-cyclical pattern in real wages and thus is open to the critique initiated by Dunlop (1938) and Tarshis (1939). Keynes (1939) accepted the lack of clear-cut empirical support for a counter-cyclical pattern and discussed several possible reasons for this, including constant marginal cost, average-cost pricing and a variable mark-up of price over marginal cost. An example of the latter using the Bhaskar model is McDonald and Sibly (2005).

Figure 2 about here

As a possibility that would apply across most firms, there are grounds for doubting the practical relevance of the lower limit to the range of employment levels where wages are determined by reference wages. Below this limit, unions would set wages below their reference wages. In as far as there is a ‘reverse dynamic’ such that reference wages follow actual wages, a downward spiral would result at such low levels of employment. However, as Keynes and Robinson emphasised, a persistent downward movement in money wages is never observed, which suggests that in practice, even at very low rates of employment the economy is still within Bhaskar’s range. This is supported by the empirical investigations of this model for Australia, Lye and McDonald (2006), and the US, Lye and McDonald (2008). Those investigations find little evidence supporting a strong persistent downward movement of money wages.

On the other hand, there is lots of evidence to support the occurrence of persistent and accelerating upward movement of money wages at high levels of employment, which, as discussed above, agrees with the observations of Keynes and Robinson. However, the dynamic causation of an upward wage spiral in the Bhaskar model is closer to Robinson than Keynes. For Keynes, the causal force was the withdrawal of labour from the workforce at the low real wages associated with high employment levels. Robinson disputed the practical relevance of Keynes’ reasoning, saying the opportunities for workers to withdraw labour were limited because the worker “must earn what he can get or starve altogether”, Robinson (1937, p. 11). She preferred an empirical approach based on the behaviour of inflation, saying that the wage spiral will occur when employment has reached a level such that “the position of the trade unions is extremely strong” and “every impediment on the side of labour to a rise in money wages finally gives way”, Robinson (1937, p. 13).

Whether the dynamic analysis below of the flex component of wage behaviour can offer any additional insights into this debate is not clear. It will be seen that after the flex-adjustment has occurred, the outcomes settle down to the equilibrium outcomes shown in Figure 2 and therefore the considerations in this debate would appear to be relevant.

3.2.3 Keynes, Bhaskar and the flex-fix pattern

With regard to the flex-fix pattern, Bhaskar and Keynes provide a more compelling explanation for fix than for flex. Consider an increase in nominal aggregate demand from a tranquil situation. The tranquil situation is described by a fairly-constant rate of increase of nominal aggregate demand, a fairly constant rate of unemployment, and a fairly constant rate actual money wage inflation, supported by an equal rate of increase of the money reference wage and thus an equal rate of increase of money wages at each union-firm node. Assume this tranquil situation is well within Bhaskar's range.

Now consider an increase in nominal aggregate demand that exceeds the rate established in the tranquil state. To analyse the effect of this on inflation, Bhaskar introduced the somewhat arbitrary idea of two modes of reference money wage formation; Keynesian and monetarist. Both modes are consistent with the prospect theory interpretation of Keynes' passive approach to reference wage formation. Under the Keynesian mode, the expansion of nominal aggregate demand is assumed not to affect the expected rate of inflation and thus the rate of increase of the reference money wage. In consequence, real aggregate demand would increase but inflation is unaffected.³⁰ Activity increases, and so the fundamental Keynesian result that nominal aggregate demand determines the real level of activity is produced by the model, but there is no upward flex. Under the alternative monetarist mode, the expected rate of inflation and thus the rate of increase of the reference money wage is determined by the expected rate of increase of nominal aggregate demand (proxied by the money supply in Bhaskar's discussion) and so an increase in the rate of increase of nominal aggregate demand will increase the rate of inflation. While this is upward flex, its basis, monetarist expectations, is not compelling. Why should people form inflation expectations according to this rule? ³¹

³⁰ This presumes the stimulus to nominal aggregate demand has not pushed employment outside the range of equilibria.

³¹ Flex can also be induced in the Bhaskar model by forcing the rate of unemployment outside the range of equilibria. However, that would not be consistent with the flex-fix sequence as observed by Keynes and Robinson because they observed flex at unemployment rates which are reasonably thought of as within the range of equilibria.

4. Meeting the challenge of introducing flex

We show in this section how the prospect theory approach to wage determination can be extended beyond the Bhaskar model to explain the Keynes/Robinson flex-fix sequence. Robinson's ideas on wage determination is shown to explain upward flex-fix. To explain downward flex-fix we move beyond both Keynes and Robinson.

4.1 Robinson's proactive postulate and the upward flex-fix sequence

In determining their wage demands, Robinson postulated that "to secure the best terms they can for their members" unions "must be on the alert to demand a rise in wages whenever there is a favourable situation for doing so", Robinson (1937, p.5). We call Robinson's idea of a union actively looking for favourable situations to demand wage increases 'Robinson's proactive postulate'. Applying the logic from above, that a union can make use of projected feelings of loss aversion to enhance the probability of resisting a wage cut, to a situation of increasing nominal aggregate demand, it is shown in this section that Robinson's proactive postulate can explain the upward flex-fix sequence.

An increase in the demand for labour will create a "favourable situation" for a wage increase. An "alert" union would post a demand for an increased wage. If this wage demand is ascribed the status of a reference wage by the members of the union then the members would also ascribe the feeling of loss aversion should the actual wage outcome be below the wage demand. To avoid suffering this loss, the members will be more intransigent against accepting counteroffers. Robinson's idea noted above that wage cuts would generate indignation which would in turn strengthen the cooperative spirit of union members would also apply to the contemplation of a wage outcome that fails to increase by as much as the wage demand.

Unlike the passive approach of Keynes and Bhaskar, passive in that the union simply follows the wages set by other unions, under Robinson's proactive postulate the union actively chooses the reference wage to enhance the achievement of the welfare of its members. In doing this, the emotional force of loss aversion enhances

the union's strategic position. Thus, as advocated by Dow (2010), emotion is intertwined with cognition.

To see with more specificity how the pattern of upward flex-fix wage adjustment can be explained by Robinson's proactive postulate, imagine an economy with a variety of firms that vary by their productivity. All the firms are unionised. Securing the best terms they can for their members, wages at any firm will be constrained by the maximum wage above which that firm would go out of business, that is the zero-profit wage. Just how close the wage can be forced towards the zero-profit wage would be influenced by union organisation and competition from outsiders. The relatively-high zero profit wage of the more productive firms is consistent with the observed positive relationship across firms between wages and their productivity.

To extend the mathematics of the union-firm wage bargain to allow for a zero-profit wage, specify a fixed cost, F , such that the firm's production function is

$Y = AL^\alpha - F$. The firm's revenue is then $PY = \bar{C}\bar{P}Y^{1-h} = \bar{C}\bar{P}(AL^\alpha - F)^{1-h}$ and so its

demand curve becomes $W = (1-h)\bar{C}\bar{P}(AL^\alpha - F)^{-h} \alpha AL^{\alpha-1}$. Using the condition for the wage bargain, equation (4) above, the limiting values of the wage mark-up,

$\{W^+ = k^+ \times W^{RES}, W^- = k^- \times W^{RES}\}$, become:

$$k^i = \left\{ 1 - \left[1 + \frac{\alpha h}{1 - \frac{F}{A(L^i)^\alpha}} - \alpha \left(\beta_1 + \beta_2^i \right) \right] \right\}^{-\frac{1}{\beta_1}} \quad \text{for } i = \{+, -\} \quad (10)$$

A shift in nominal aggregate demand is a shift in $\bar{C}\bar{P}$. Regardless of how a nominal aggregate demand shift is split between C and $\bar{P}$, the shift in the firm's labour demand curve is the same. The zero-profit employment level, $\tilde{L}$, is determined by

$$\tilde{L} = \left[\frac{F}{A[1 - (1-h)\alpha]} \right]^{\frac{1}{\alpha}} \quad (11)$$

and so is independent of $\bar{C}\bar{P}$. The zero-profit money wage, $\tilde{W}$, is determined by

$$\tilde{W} = (1-h)C\bar{P} \left(A \left[\frac{F}{A[1-(1-h)\alpha]} \right] - F \right)^{-h} \alpha A \left[\frac{F}{A[1-(1-h)\alpha]} \right]^{\frac{\alpha-1}{\alpha}} \quad (12)$$

and so is proportional to the level of nominal aggregate demand through $C\bar{P}$.

Now, imagine an increase in demand, evenly spread across all firms. Profitability at all firms would increase. Robinson's proactive postulate implies that unions at all firms would consider demanding higher wages.

To clarify this process of upward flex-fix in a way that indicates the role of the three groups of factors that Robinson argued would be important in encouraging wage demands, that is, as noted above, union organisation, competition from outsiders, and profits, consider the representation of an economy with just two firms, of low and high productivity, in Figure 3. The initial positions with the labour demand curves for the low and high productivity firms, $L_1^{D,L}$ and $L_1^{D,H}$ respectively, shown as downward-sloping unbroken lines, are the two wage-employment outcomes A^L and A^H .³² The two vertical axes indicate the zero employment levels for the low productivity firm and the high productivity firm. The upper end of the labour demand curves indicates the wage that would yield zero profits. The union at the low productivity firm has been able to get close to the zero-profit wage. This wage outcome reflects the positive effect of the union's organisation and the negative effect of competition from primarily the unemployed. Note that workers at the high productivity firm would not be interested in shifting to the low productivity firm. The union at the high productivity firm has been able to enforce a higher wage, helped by the higher profitability of the high productivity firm but held back by competition from both the unemployed and workers at the low productivity firm.

Figure 3 about here

An increase in aggregate nominal demand shifts up the labour demand curves to the downward-sloping broken lines, to $L_2^{D,L}$ and $L_2^{D,H}$. Applying Robinson's proactive postulate, the unions at each of these firms will consider demanding a higher money wage. Note the difference with the 'passive' unions of Keynes and

³² The wage employment outcome being on the labour demand curves imply that monopsony power has been eliminated, an important role of unions emphasised, indeed pioneered, by Robinson.

Baskar. In doing this they will factor in that their money wage demand will become the reference money wage for their members with the associated drive from loss aversion and thereby enhancing the probability of a successful wage demand.

Exactly what money wage they will demand, and thus the exact amount of upward flex, is not tied down by the analysis here of Robinson's proactive postulate, even when applied using prospect theory. Some restrictions are suggested by the analysis. First, one might reasonably require the union to be satisfied with its wage demand if it were successful. Indeed, this may be thought of as a requirement of being able to factor in loss aversion in a supporting role. This constraint follows the rational expectations approach to setting the reference level of Koszegi and Rabin (2006) and Heidhues and Koszegi (2008).³³ However, this would simply rule out wage demands outside the wage limits $\{W^+, W^-\}$ and also above the zero-profit wage. Second, one might also reasonably rule out the union considering, in the face of an increase in labour demand, a reduction in wages relative to the existing wage. However, ruling out both these sets of possibilities still leaves many possibilities.

For the purposes of this paper consider two possibilities. The outcomes $\{B^L, B^H\}$ take the full upward shift in the labour demand curves and leave employment unaffected. By contrast, the outcomes $\{C^L, C^H\}$ have smaller increases in money wages and allow some increase in employment. We can infer from the purely nominal expansion in demand that when general equilibrium pressures have adjusted the aggregate price level, the outcomes $\{C^L, C^H\}$ represent a decrease in real wages.

Robinson (1937, p. 39) gives some guidance on this when she said "those unions which are in the strongest position (either because of better organisation or because of a more favourable situation in their industries) will secure the greatest rise in money wages when an upward movement occurs". This suggests that unions would prefer, in her view, the outcomes $\{B^L, B^H\}$ to $\{C^L, C^H\}$, that is outcomes closer to the zero-profit wage. Thus, if their organisation is strong enough to achieve something like $\{B^L, B^H\}$ then those are the wages that they will demand. They would prefer more upward flex.

³³ Koszegi and Rabin (2006) study the behaviour of consumers facing exogenously-set prices. Heidhues and Koszegi (2008) extend Koszegi and Rabin (2006) to study price-setting and so is more relevant for Robinson's proactive postulate.

Competition from outsiders would be a restraining influence on union wage demands. Thus, at low levels of unemployment the union's wage demands would get closer to the zero-profit wage.³⁴

Of course, the presentation of Robinson's proactive postulate here has given an exactitude to the position of the labour demand curve which would not apply in practice. Robinson herself would argue strongly against falling prey to this exactitude. Two extensions are suggested. First, to allow for a contrast between temporary and permanent shocks along the lines of Ahrens, Pirschel and Snower (2017) and second to allow for uncertainty in the size of the shift in demand along the lines of Koszegi and Rabin (2006) and Heidues and Koszegi (2008). But these extensions are placed beyond the scope of this paper.

Furthermore, even if information is "perfect" the pathological outcome of bargaining impasse and a strike may occur if either or both sides to the bargain suffer from self-serving bias. Babcock and Lowenstein (1996) showed how teachers unions and education boards adopted wage comparisons that were excessively favourable to them and this reduced the probability of an agreement without a teachers' strike.

Finally, the social and political context may influence the degree and nature of unions' proactivity. As a parallel with the idea that the "psychology of the market" is a driving force in financial markets, see Dow (2010, pp.9-10), this may be called the psychology of the labour market. For example, McDonald (2017) argues that the Prices and Incomes Accord, a tripartite agreement between the Australian government, the ACTU and employers in the 1980s, was a change in the social and political context which effectively reduced the reference real wage and thus the real wage demands of trade unions. This enabled an expansion in aggregate demand to occur without an increase in inflation, outcomes more like $\{C^L, C^H\}$ than $\{B^L, B^H\}$ in Figure 3. By contrast, the social and political context earlier, in the 1970s and early 1980s, was associated with aggressive wage demands by unions.

The large increase in wage share and the associated increase in unemployment in the early 1970s played an important role in changing the social and political context, and especially the attitude of the trade union movement, thereby enabling the Accord. In this agreement to restrain real wages, the experience of the 1970s and early

³⁴ However, this in itself is not a sufficient basis for Robinson's inflation zone because when employment had settled at a particular level, wages would tend to increase with the zero-profit wage. It is not clear to me whether or how a positive relation between inflation and employment can be derived.

1980s had a major influence. The change in attitude of the trade union movement is suggestive that the earlier outcomes were an example of what Earl (2005, p.915) has called “pathological”.

Thus, what is presented here is a guide to some underlying principles which would benefit from the further development of Robinson’s ideas.

4.3 How extreme duress can explain the downward flex-fix sequence

Neither Keynes nor Robinson spelled out how a decline in demand can cause a downward flex-fix sequence even though downward flex-fix was glaringly apparent at the time they wrote. Nor does the Bhaskar model provide an account. In this section we make an extension to the Bhaskar model to explain the downward flex followed by fix observed by Keynes and Robinson.

To explain large amounts of downward flex in money wages, this section shows how the existence of a zero-profit wage can cause a downward movement of money wages to a new stable level as an economy falls into depression. A zero-profit wage is implied if technology is such that there is a minimum level of activity required for non-negative profits at the firm or plant level. As noted above, Robinson regarded profits as an influence on wage outcomes. Furthermore, this extension of the Bhaskar model applies Robinson’s description of trade union behaviour, which is “to secure the best terms they can for their members”, Robinson (1937, p.5), to cases where demand for labour contracts substantially: ‘Robinson’s defensive postulate’?

Empirical support for how the threat to firms of losses can explain the flex-fix sequence of money wages comes from Truman Bewley’s interviews of managers of firms and labour leaders. Bewley observed that, on the one hand, managers were reluctant to reduce money wages even when there was a plentiful supply of labour, see especially Bewley (1999, pp. 111, 134, 175, 176, 196, 431, and 432). On the other hand, Bewley observed that managers and workers would agree on wage cuts if that relieves pressure to close down the firm or plant and thus saves jobs, see Bewley (1999, pp. 173, 181, 376-82 and 395). Bewley (1999, p.395) concluded “Workers view a company financial crisis as a legitimate reason for cutting pay, particularly if the cuts could save jobs or the company. Employers believe they would have little difficulty convincing employees that a financial crisis was real.” Thus, for a firm in

extreme distress, the effect of a change in money wages is not “obscure and difficult to diagnose” and so, in these circumstances, is an exception to Robinson’s sceptical comment reported above.

This explanation of wage cuts is supported by the earlier work of Henle (1973) and later by Akerlof, Dickens and Perry (1996), who concluded from Bureau of Labor Statistics data that “downward rigidity is broken when firms are under extreme duress”, Akerlof, Dickens and Perry (1996, p.9).

There is also experimental evidence that supports the idea that workers will accept pay cuts when firms are under extreme duress. Using a gift-exchange experimental design, Gose and Sadrieh (2012) found that the possibility that the employer would make losses induced the employee-subjects to accept lower wages and offer higher effort. More effort per wage unit would reduce the size of loss for the employer.

To see how applying prospect theory with a zero-profit wage can explain the downward flex-fix sequence of money wages, consider Figure 4. In Figure 4, the union’s objective is represented by three indifference curves in {wage, employment} space, IC_A , IC_B and IC_C . To bring out the loss-aversion kink that occurs at the wage equal to the reference wage, I have drawn the two arms of each indifference curve as straight lines.

Figure 4 about here

Three downward-sloping labour demand curves are shown in Figure 4. A crucial feature of these labour demand curves for the argument that follows is that they peak at the {wage: employment} combination which yields zero profits, that is at the zero-profit wage. Higher wage rates would cause losses which, we assume, would force the firm out of business.³⁵

In a state of high demand represented by the labour demand curve labelled L_A^D , the union’s optimal wage demand is W_A , which, as the kink in IC^A shows, is

³⁵ This assumption could be made more complicated by allowing the possibility of a temporary period of losses. Then the highest feasible wage could be a little higher. If the firm were financially weak then holding out for a temporary period of losses would be more difficult and so the highest feasible wage would be lower. Alternatively, if the firm has a credible exit strategy, such as relocating to a region where unions are weaker, then the threat of closing down would be stronger and so the ability to get the union to accept a wage cut would be easier. These considerations would complicate the analysis without changing the conclusions I draw.

equal to the reference wage. A decrease in demand that shifts the labour demand curve to L_B^D leaves the union's desired wage unaffected. The adjustment would fall on employment, which contracts to L_B . As I have drawn it, outcome B occurs at the zero profit point on the labour demand curve, L_B^D . A further decrease in demand and thus a further downward shift in the labour demand curve to L_C^D pushes the zero profit point below the reference wage. Now the union's optimal wage demand, even with an unchanged reference wage equal to W_B , as shown by IC_C , is to set a lower wage, a wage equal to $W_C < W_B$. To stick with a wage equal to the pre-existing reference wage would cause employment to fall to zero which, as the indifference curves show, would yield a lower level of union utility than the reduced wage of W_C and associated employment level of $\tilde{L}$. The feelings of loss aversion from the reduced wage are dominated by the alternative outcome of no jobs.

Under either the Keynes/Bhaskar assumption of the reliance on the “wages of other workers” or Robinson's own-wage reliance, a macro downturn with all firms moving from point B to point C in Figure 4 will cause a downward adjustment in the reference wage to W_C .³⁶ Flex has been followed by fix. The wage has settled. Thus the wage reaction to the decrease in demand from L_B^D to L_C^D shows how the model can explain the downward flex-fix sequence of money wages.

Note that in the 1930s the drop in employment was very large and so the downward wage adjustment that occurred did not prevent bankruptcies. Money wages did fall to new levels at the firms that survived, consistent with the explanation here of downward flex-fix. At the firms that did close there was perhaps no feasible wage at which these firms could have continued to operate, given the low level of aggregate demand.

5. Conclusion

In the 1930s, Keynes (1936) and Robinson (1937) observed a flex-fix sequence of wage behaviour, according to which money wages may change in response to a change in aggregate demand (=flex) but will then settle at a new level

³⁶ That “the reference point is usually the status quo” Kahneman (2003b, p.1457), reinforces the idea that the reference wage will adjust to W_C .

(=fix), even if unemployment is high. This sequence carries over in first-derivative form to economies in the post-1945 period when rates of wage inflation were generally positive.

The ideas on wage determination of Keynes (1936) and Robinson (1937) are argued in this paper to be consistent with prospect theory. Furthermore, it is shown that prospect theory can explain the flex-fix sequence of money wage adjustment. Bhaskar's (1990) application of prospect theory to Keynes' ideas showed that loss aversion can explain the fix. Upward flex can be explained by incorporating what is called here Robinson's proactive postulate, whereby unions take advantage of increases in demand to increase their wage demands. Downward flex can be explained by incorporating the idea of "extreme duress", using the language of Akerlof, Dickens and Perry (1996, p.9), that is even if a union is concerned about loss aversion with respect to a reference wage, it will allow wage cuts if they are necessary for the survival of the firm or plant.

Robinson's proactive postulate reconciles downward wage rigidity with an upward movement in money wages in an inflationary situation, which is a considerable advance on Keynes. By introducing inflation expectations into Keynes' approach, Bhaskar (1990) also provides a reconciliation, but it is not as compelling as Robinson's because the determination of expectations is not explained in Bhaskar's model.

While Keynes explicitly recognised the possible influence of other workers' wages on wage behaviour, Robinson regarded this channel of influence as "both dubious and unnecessarily complicated" and postulated instead that the business of trade unions is "to secure the best terms they can for their members", Robinson (1937, pp.4-5). Thus, Robinson explicitly ruled out the social dimension, an important element of behavioural economics. Given the importance of relativities in the literature on wage determination, Robinson probably went too far in this respect. But her emphasis on unions taking an active approach, in her proactive postulate, is surely realistic, for example as suggested by the empirical evidence on speed limits, and does not preclude allowing for the social dimension in a broader model.

According to Robinson's proactive postulate, unions can play a role in keeping real wage growth in line with productivity growth, even if there is excess supply in the labour market. However, if unions are weak then the model suggests that real

wages could lag behind productivity, which may be a cause of the decrease in the wage share in recent decades.³⁷

In magnifying feelings associated with losses, loss aversion may be thought to be irrational. However, loss aversion is an empirically observed characteristic of human behaviour. If it flouts a set of axioms deemed to be rational by conventional economic theory, then so much the worse for those axioms.

Dow (2010) emphasises the central role that emotion should play in realistic analyses of human behaviour and discusses the various ways in which emotion may combine with cognition. In line with Dow's emphasis on the importance of emotion, the interpretation of loss aversion favoured in this paper is that it is a description of a powerful emotion, an example of, to use the words of Robinson (1937, p.231), "human sentimentality". By being backed up by loss aversion, the reference level may have a powerful grip on a worker's imagination, capturing the worker's attention and thereby overruling an optimal assessment of all the available options. Emotion would play a part in strengthening this grip and may make a strategic contribution to achieve outcomes with high wages.

Keynes and Robinson both recognised the importance of psychology in the determination of wages.³⁸ However, they did not develop these insights because they were sceptical of the usefulness at that time of the science of social psychology. And then with the natural rate revolution, psychological approaches were discarded. But now things are different. It is suggested that returning to the insights of Keynes and Robinson using prospect theory offers an improvement in our understanding of wage determination and the inflation-unemployment relation which is more in keeping with Keynes' theory of the influence of aggregate demand on employment than is the natural rate approach of New Keynesian and Real Business Cycle theories.

³⁷ The mechanism of efficiency wages combined with loss aversion could also explain wage stickiness. Indeed, in an earlier version of his paper Bhaskar (1990, p.65) used efficiency wages instead of trade union power. More recently, Dickson and Fongoni (2016) developed an efficiency-wage model in which loss aversion generates wage rigidity around a reference wage. Note that Robinson's proactive postulate seems less relevant in the employer-driven efficiency wage set-up and so if employment is sustained at low levels, real wages may fall behind productivity.

³⁸ Institutions and history also play a role, a role that can be seen as intertwined with emotions and psychology, as was suggested above by Australia's experience during the 1970s and 1980s.

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Figures

Figure 2 The range of equilibria: Loss aversion causes a range of equilibrium employment outcomes that lies on the labour demand curve between the minimum and maximum equilibrium levels of employment (L^{MIN} and L^{MAX})

Figure 3 Robinson's proactive postulate: Possible wage responses to an increase in the demand for labour

Figure 4 Extreme duress: How a decrease in labour demand can over-rule the tendency of loss aversion to keep wages from falling