Commentary:
What Is Natural About Unemployment?
Policy Sources and Implications of
Labor Market Rigidities

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Giuseppe Bertola makes a two-point argument: 1) cyclical fluctuations in employment and hours are inefficient; 2) therefore, regulations and distortions that make employment and wages more difficult for firms and workers to adjust can mitigate the harm of fluctuations.

In the first part of this discussion, I review some evidence in support of Bertola's presumption that cyclical fluctuations appear highly inefficient. More exactly, in recessions a wedge develops between labor's marginal product and labor's reservation wage (i.e., workers' marginal rate of substitution). I then turn to the session topic of wage dynamics, asking how one should measure fluctuations in the marginal price of labor given that most workers are employed in more durable matches than a spot market. I ask whether wage rigidities are the driving force for inefficient fluctuations in employment and hours. And, if not, should we view employment decisions as unswayed by the cost of labor during recessions (as in Bertola's Figure 2). Lastly, I consider Bertola's argument that adding frictions are quite possibly beneficial, given employment fluctuations are excessive and inefficient. Here I draw on some evidence as well as model results from the literature. The channels Bertola suggests for rigidities improving workers' circumstances are speculative. I speculate they may not be so helpful, especially if one considers all workers, not just

those currently employed, as any increase in firing costs is also a de facto increase in hiring costs.

I.   The Labor Wedge as a Measure of Inefficient Fluctuations

Bertola's starting point is that cyclical fluctuations in the labor market are highly inefficient. A standard way to illustrate this inefficiency is to look at what is known as the cyclicality in the labor wedge: the ratio of labor's marginal product (MPL) to workers' marginal rate of substitution between consumption and leisure (MRS). Efficiency requires MPL equal to MRS. But a number of papers (e.g., Hall 1997) show that in recessions a large wedge opens up with MPL exceeding MRS, as suggested in Bertola's Figures 1 and 2.

We do not observe MPL or MRS as data; so data are blended with assumptions on functional forms and parameters to quantify these variables. My assumptions here are either standard or defensible based on prior choices in the literature (e.g., Shimer 2009; Hall 2009). Production is Cobb-Douglas. This implies that cyclical movements in the MPL are reflected by movements in labor's average product. We assume preferences are time-separable and separable intratemporally with respect to consumption (C) and hours worked (H), with intertemporal substitution in consumption (σ) and Frisch (η) elasticities that are both constant. Cyclical movements in the MRS are then reflected by movements in the combination $C^{1/\sigma}$ and $H^{1/\eta}$. I choose values of 0.5 for both elasticities, intertemporal and Frisch. I measure C by real spending on nondurables and services as reported by NIPA; H is measured by weekly hours of work as reported by the BLS' Program on Labor Productivity and Costs (*www.bls.gov/lpc/*).[1]

The resulting time series for (*ln*) of the *MPL* and the *MRS* (HP-filtered) appear in Chart 1 for 1987-2012, with NBER-defined recessions shaded. Labor productivity is relatively acyclical. But the *MRS* plummets dramatically with each recession: the decline in the workweek and, especially, the decline in consumption imply that recessions sharply reduce the real wage workers require to entertain working an additional hour. Chart 2 displays the (*ln*) labor wedge together with real GDP. It increases dramatically during recessions.

Chart 1
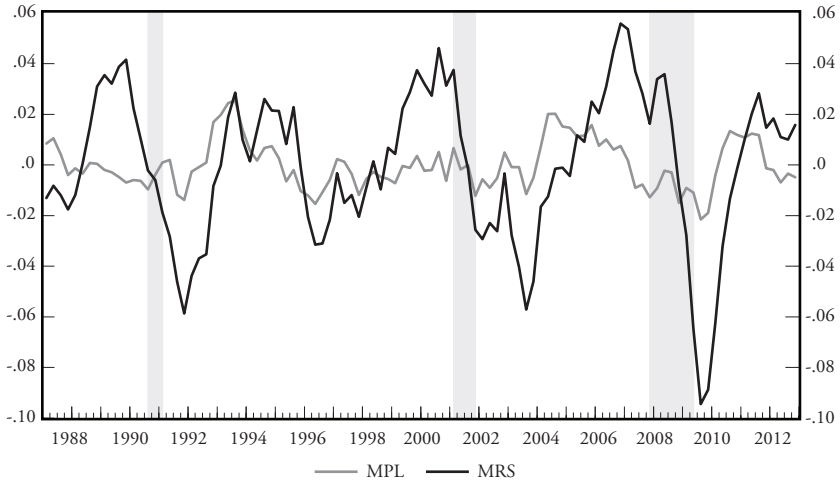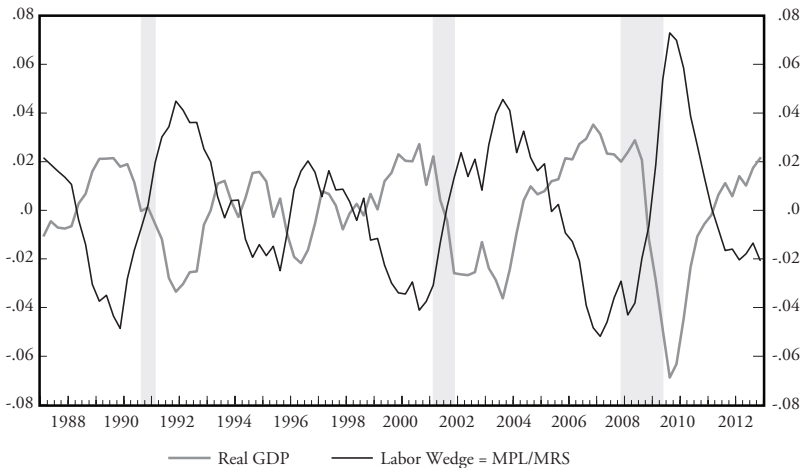## Cyclicality in MPL versus MRS (Both HP-Filtered)

MPL —— MRS

Chart 2
Cyclicality of Labor Wedge = MPL/MRS

—— Real GDP —— Labor Wedge = MPL/MRS

If we include the wedge movements that typically extend before and after recessions' NBER dates, the last three recessions display increases in the wedge of 8, 6 and 10 percentage points, respectively. Regressing the wedge movements in Chart 2 on aggregate movements in total hours, reflecting cyclicality in both employment and work-weeks, yields an elasticity of -1.4. So the wedges that open up

between the MPL and MRS in recessions are big. In fact, this evidence coincidently matches remarkably closely the *relative* size of wedges depicted in Bertola's Figures 1 and 2.

II.   Measuring the Cyclical Price of Labor

Bertola depicts two sources of inefficient labor fluctuations, wage rigidities and distortions, such as pricing rigidities, that cause labor demand to fluctuate more than rationalized by the *MPL*. In the next section, which borrows freely from Bils, Klenow and Malin 2014 (BKM going forward), I discuss which of these cyclical distortions appears most relevant for the United States for recent recessions. The answer to that question seems key to understanding labor fluctuations and is presumably relevant for attempts at policy.

The answer hinges on how we view and measure the cyclical price of labor. Time series for labor productivity and average hourly earnings fluctuate comparably over business cycles. This has led some researchers to conclude that there is little cyclical distortion of Bertola's second type, causing labor demand to fluctuate relative to its marginal product.[2] But labor is rarely transacted in a spot market; and average hourly earnings fail to capture cyclicality in labor's price for more realistic trades. Oi (1962) shows that if there are important adjustment costs for labor, then its price is more pro-cyclical than the flow of wage payments—a marginal labor increase in booms requires hiring and training a worker, whereas in downturns it might mean laying off one fewer worker. Perhaps more importantly, in long-term employment the price of labor is not captured by the average hourly wage because payments are smoothed for convenience or insurance.[3] Many papers, covering a number of countries, find empirical support for such wage smoothing.[4]

Kudlyak (2013) points out that the wage cost of employing more labor today reflects not only the current wage payment, but also any impact hiring today, versus waiting, has on the required wage payments for future periods.[5] Only if workers separate each period or if their future wages are independent of when hired will this cost simplify to the current wage. Kudlyak employs panel data (National Longitudinal Survey of Youth) to examine the wage cyclicality of job

Table 1
Cyclicality of Labor's User Cost
(NLSY, std. errors in parentheses)

Wage Measure	Semi-elasticity wrt Unemployment Rate
Average Hourly Earnings	–1.8 (0.7)
New-Hire Wage	–3.0 (0.8)
User Cost of Labor Wage	–5.2 (0.8)

Source: Kudlyak (2013).

stayers, new hires and the extent to which the cyclical impact on wages for new hires persists beyond the year hired. Consistent with prior studies, Kudlyak finds that wages for new hires are more pro-cyclical than that for job stayers. Furthermore, since there is some lock-in effect, hiring at the depth of a recession results not only in a lower wage, but also lower cost for that worker for several subsequent years. For this reason, the effective price of labor (the wage component of labor's user cost) is even more cyclical than the new hire wage. This is shown in Table 1, distilled from her paper. The user cost is nearly three times as cyclical as average hourly earnings. For instance, for an increase in the unemployment rate of 3 percentage points (roughly the average increase over the last three recessions), this implies labor's user cost falls by 15.6 percent, compared to 5.4 percent in average hourly earnings.

III.   Ascribing the Cyclical Wedge to Product versus Labor Market Inefficiencies

The cyclical labor wedge, illustrated in Chart 2, can be partitioned between a product market distortion, reflected by a wedge between labor's marginal product and the real wage, versus a labor market distortion, reflected by a wedge between the real wage and workers' marginal rate of substitution.[6] As stated above, if the wage is measured by average hourly earnings, then most of the cyclicality in the labor wedge gets attributed to the labor-market distortion. We illustrate in BKM, however, that for a price of labor as cyclical as Kudlyak's user cost, the entire cyclicality in the labor wedge should be ascribed to the product market wedge. Given this ambiguity, in BKM we examine evidence on the size of the cyclical product-market wedge that does not require measuring cyclicality in the price of labor. In turn,

this tells us the relative importance of the labor-market and product-market distortions in overall cyclicality of the labor wedge.

First, we estimate the labor wedge for the self-employed. Cyclicality in the labor wedge for the self-employed must reflect a product market wedge, as it cannot be imputed to sticky wages or other labor market frictions. We show that workweeks and annual hours for the self-employed are at least as cyclical as for wage earners. In turn, we find that the labor wedge is roughly as cyclical for the self-employed as for wage earners. Second, we show that the productivity of intermediate inputs, as measured by gross output per intermediate, is countercyclical, while the relative price of intermediates is highly pro-cyclical. This implies that real marginal cost is highly pro-cyclical, consistent with much of the cyclicality in the labor wedge deriving from the product market wedge. Finally, we estimate cyclicality in the product market wedge based on cyclicality in work-in-process inventories in manufacturing. We show that work-in-process inventories increase relative to output during downturns, despite the high stochastic discount rate in recessions, given the decline that occurs in consumption. As with intermediates, this requires that real marginal cost is highly pro-cyclical. So, consistent with our other evidence, this implies that much of cyclicality in the labor wedge reflects the product market wedge, not sticky wages or other labor market distortions.

A possible explanation for a countercyclical product market wedge is sticky goods prices that fail to decline with marginal cost in recessions. This is the scenario that Bertola depicts in his Figure 2. Firms do not hire sufficient labor to equate marginal product to the real wage because firms are constrained from selling that much output at their sticky prices. One might infer from this scenario that policies driving up labor's cost during recessions (e.g., added unemployment benefits) might not impinge on employment. But I would warn against drawing that conclusion.

For one, there are other explanations for a cyclical product market wedge than sticky nominal prices. Firms may purposely choose higher markups during recession because they face less competition or less elastic demand. (Rotemberg and Woodford 1999, survey some possible channels.) There are other reasons firms might require

a high marginal profitability during recessions. For instance, if added production has an investment component, such as building a customer base, then high discounting during recessions will drive up the measured product market wedge.[7] These scenarios imply that labor demand will decline relative to its marginal product during recessions. Yet firms will choose labor based on a marginal calculation of its payoff versus its cost—firms are not constrained in their choice of labor input as in Bertola's Figure 2.

Even if price stickiness is an important source for a cyclical product market wedge, this does not imply that employment is not responsive to the cost of labor. A realistic model of price stickiness must recognize that a fall in the price of labor will induce some firms to cut their sticky prices. The induced price changes will reflect, not just the decline in wage, but also any unfulfilled changes in their desired prices, magnifying the impact on production and employment. Many firms, especially in cyclical industries, hold inventories or produce to orders. These firms, even if their price is ruthlessly sticky, must make decisions on how much to produce to inventory or how rapidly to fulfill orders. These firms will still be making marginal decisions on labor, comparing these benefits of extra production to the effective price of labor. Thus policies that increase labor's cost will reduce employment and hours.

IV.   What Is Likely Impact of Added Frictions?

Given a presumption that fluctuations are inefficient, Bertola points out that policies that add to employment rigidities could possibly be beneficial by reducing separations. Furthermore, these rigidities, and wage rigidities, might stabilize aggregate spending by providing a form of social insurance. Bertola is not overly specific about what policy proposal is being advised or where. For concreteness, I think it is reasonable to take it as a policy that adds to firing costs (say a tax) applied to a country where these costs currently are important, but not especially high relative to other countries (say the United States).

There is consensus that adding burdens such as firing costs will reduce the separation rate among workers (e.g., Mortensen and Pissarides 2001). But there is also consensus that such costs reduce

Chart 3
Separation and Quit Rates, U.S. Private Economy
(JOLTS, quarterly, seasonally adjusted)
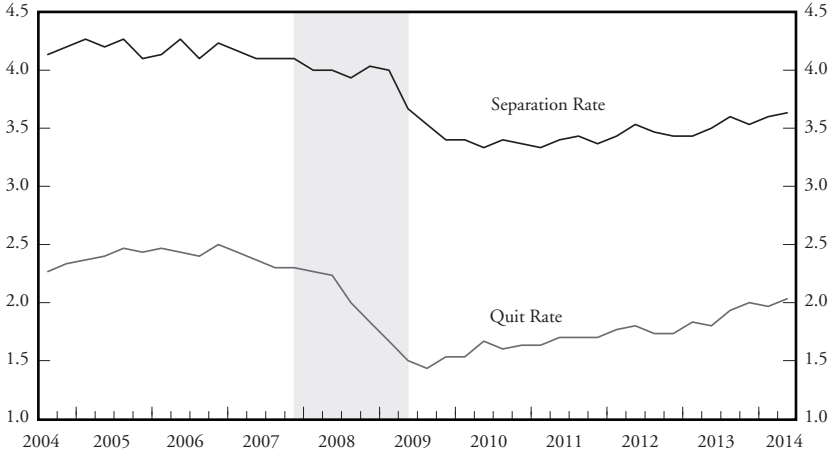
vacancies and hiring, with an impact on unemployment that is ambiguous at best, while causing long-run misallocations (e.g., Mortensen and Pissarides 2001; Bentolila, Cahuc, Dolado and Le Barbanchon 2012). Davis and Haltiwanger (this volume) discuss efficiency losses of a more stagnant labor market. So, if there is a case for adding frictions, it is driven by the notion that any benefits from less volatile employment overwhelm the harm from reduced economic performance on average.

But it is not clear that firing rigidities soften drops in employment by much or for long. Hiring dynamics in Mortensen-Pissarides-type models are rapid when matched to empirical magnitudes for hiring and separation rates (at least for most countries, e.g., Elsby and Şahin 2013). These dynamics are apparent in U.S. labor flows during and after the Great Recession. The quit rate in the U.S. declined sharply in 2008 and has been slow to recover. This is illustrated with data from the BLS JOLTS in Chart 3. The layoff rate spiked in 2008, remained high going into 2009, but then quickly receded. As a result, there was a dramatic decline in the overall separation rate in 2009 and beyond (see, again, Chart 3 from JOLTS). But this decline in separation rates arguably did little to spur net employment growth, as hiring rates also remained remarkably low, given income growth,

Table 2
Households Spending 2008 Stimulus, by Income, Stock Holdings

Income Group	% mostly Spending	Stock-holding Group	% mostly Spending
$0 – $35,000	21%	No stocks	20%
$35,000 – $75,000	17%	$1 – $250,000	19%
> $75,000	26%	> $250,000	39%

Source: Sahm, Shapiro, Slemrod (2010).

during and after the recession. This same offset could occur in response to an increase in firing costs.

Bertola also states that employment and even wage rigidities can stabilize aggregate spending in downturns by reallocating income toward workers with higher propensities to spend. But is this channel important? It is clear that high-income households display a lower average propensity to consume. That strongly suggests that households' marginal propensity to consume is significantly less than their average propensity. But it does not imply there is an important decline with income of marginal propensity to consume. Perri and Steinberg (2012) study cyclicality of consumption by income class. They find it has been just as cyclical at high as for low incomes, which appears counter to a marginal propensity to consume that decreases sharply with income. A set of studies have examined spending responses to receipt of stimulus payments; these typically stratify households by their income or asset level. Results are mixed. Sahm, Shapiro and Slemrod (2010) ask households whether they primarily spent or saved rebates from the Economic Stimulus Act of 2008. They find that higher income or higher asset households are as likely to spend. (See Table 2, taken from their paper.) Shapiro and Slemrod (2003) find similar results based on the 2001 stimulus program. Johnson, Parker and Souleles (2006) also examine responses to the 2001 stimulus rebates, but use an instrumental variables strategy based on the randomized timing of its payments. They do find that households with lower incomes or less liquid wealth spent more of the rebate.

Bertola argues here, and in Bertola (2014), that while more regulations reduce the economy's productivity, they will also reduce inequality. The latter claim is not clear. These regulations are likely

to harm younger workers or those prone to misplacement because of lack of skills, skills residing in a volatile sector (like residential construction), or broader havoc in their lives that interrupts stable employment. So, while such regulations will presumably smooth some households' consumption growth, it is less clear what it implies for overall income and consumption inequality. Regulations, such as firing costs, also give employers strong interest in hiring only applicants with an employment record (or statistical profile) that predicts they can remain employed at profit. Firing costs are antipathetic to experimenting in hiring. So it cuts against providing opportunity to those with little or less impressive records. Given what we understand about labor markets, the harm from further rigidities seems likely to swamp any short lived, recession time benefits. Of course, there is a lot we do not understand. But Bertola's policy angle is not robust to that uncertainty. And its direction is difficult to reverse, if clearly failing. If the objective is to subsidize employment and hours during recessions, why not pursue that as policy? For instance, indexing payroll or value added tax rates to a measure of temporary fluctuations would reduce the cyclicality of the labor wedge.[8] A similar, but more targeted policy would be to index the Earned Income Tax Credit to the business cycle. This would affect workers whose labor demand and supply might be most elastic, while partially offsetting disincentives from extensions in unemployment insurance during downturns. I am not convinced these policies are wise—but what is the empirically plausible story that they are dominated by placing more regulation and costs on the employment relation?

Endnotes

[1]The MRS in wedge calculations is typically constructed with total labor, rather than the workweek. But the motivation for measuring the wedge is more consistent with the intensive, workweek margin. In Bils, Klenow and Malin (2014) we calculate cyclicality in labor wedges at both the intensive margin (which I mirrored here) and an extensive margin, where employment is determined in a matching setting with vacancies. We find cyclicality in the extensive-margin wedge that is similar to what I depict here for the intensive margin.

[2]Examples include Gali, Gertler and Lopez-Salido (2007), and Karabarbounis (2014).

[3]Rosen (1985) reviewed the implicit contracting literature to that date. His Figure 2, and related discussion, shows clearly how a very pro-cyclical marginal price of labor is consistent with acyclic or countercyclic average hourly earnings.

[4]For instance, Bellou and Kaymark (2011) find workers hired during recessions start at lower wages, then show predictably higher wage growth than other job stayers, with it taking several years for the impact of labor-market conditions when hired to be erased. This history dependence is consistent with implicit contracting, but not a spot labor market, even if cyclicality in match quality is entertained.

[5]That is, the true wage cost of more labor today equals its impact on the firm's present-discounted value of all current and future wage payments, holding future labor hours constant. Kudlyak calls this the wage component of labor's user cost (distinct from hiring and other adjustment costs). For her benchmark case it is defined by:

$$P_t = w_{t,t} + E_t \left(\sum_{\tau=1}^{\infty} \left(\beta^\tau \prod_{k=0}^{\tau-1} \left(1 - \lambda_{t+k}\right) \right) \left(w_{t,t+\tau} - w_{t+1,t+\tau} \right) \right).$$

w_{ij} is wage of worker in j hired in period i. λ_j is separation rate in j.

[6]That is, the Labor Wedge $= \dfrac{MPL}{MRS} = \dfrac{MPL}{W/P} \bullet \dfrac{W/P}{MRS} =$ Product-Market Wedge $\bullet$ Labor-Market Wedge.

[7]Increased risk aversion during recessions might also cause firms to require a high marginal product relative to a factor's price. See BKM for further discussion.

[8]It would also promote cyclicality in the government deficit, which can stabilize labor demand under certain model scenarios, as Bertola discusses.

References

Bellou, Andriana, and Baris Kaymark. 2011. "Real Wage Growth over the Business Cycle: Spot vs. Contractual Markets," manuscript, University of Montreal.

Bentolila, Samuel, Pierre Cahuc, Juan J. Dolado and Thomas Le Barbanchon. 2012. "Two-Tier Labour Markets in the Great Recession: France vs. Spain," *Economic Journal*, vol. 122, F155-F187.

Bertola, Guiseppe. 2014 "Labor Market Policies and European Crises," *IZA Journal of Labor Policy*, vol. 3, no. 5.

Bils, Mark, Peter J. Klenow and Benjamin A. Malin. 2014. "Resurrecting the Role of the Product Market Wedge in Recessions," manuscript, September.

Davis, Steven J., and John Haltiwanger. 2014. "Labor Market Fluidity and Economic Performance," *Re-Evaluating Labor Market Dynamics*, Jackson Hole Economic Policy Symposium, Federal Reserve Bank of Kansas City, Aug. 21-23.

Elsby, Michael W., Bart Hobijn and Ayşegül Şahin. 2013. "Unemployment Dynamics in the OECD," *The Review of Economics and Statistics*, vol. 95, no. 2, pp. 530-548.

Gali, Jordi, Mark Gertler and J. David Lopez-Salido. 2007. "Markups, Gaps, and the Welfare Costs of Business Fluctuations," *Review of Economics and Statistics*, vol. 89, no. 1, pp. 44-59.

Hall, Robert E. 1997. "Macroeconomic Fluctuations and the Allocation of Time," *Journal of Labor Economics*, vol. 15, no. 1, pp. S223-250.

Hall, Robert E. 2009. "Reconciling Cyclical Movements in the Marginal Value of Time and the Marginal Product of Labor," *Journal of Political Economy*, vol. 117, no. 2, pp. 281-323.

Johnson, David S., Jonathan A. Parker and Nicholas S. Souleles. 2006. "Household Expenditure and the Income Tax Rebates of 2001," *American Economic Review*, vol. 96, pp. 1589-1610.

Karabarbounis, Loukas. 2014. "The Labor Wedge: MRS vs. MPN," *Review of Economic Dynamics*, vol. 17, no. 2, pp. 206-223.

Kudlyak, Marianna. 2013. "The Cyclicality of the User Cost of Labor," Federal Reserve Bank of Richmond Working Paper 09-12.

Mortensen, Dale T., and Christoher A. Pissarides. 2001. "Taxes, Subsidies and Equilibrium Labour Market Outcomes," CEPR Discussion Paper No. 2989, October.

Oi, Walter Y. 1962. "Labor as a Quasi-fixed Factor," *Journal of Political Economy*, vol. 70, no. 6, pp. 538-555.

Perri, Fabrizio, and Joseph Steinberg. 2012. "Inequality and Redistribution during the Great Recession," Federal Reserve Bank of Minneapolis Economic Policy Paper, February.

Rosen, Sherwin. 1985. "Implicit Contracts: A Survey," *Journal of Economic Perspectives*, vol. 23, no. 3, pp. 1144-1175.

Rotemberg, Julio J., and Michael Woodford. 1999. "The Cyclical Behavior of Prices and Costs," in J.B. Taylor and M. Woodford, eds., *Handbook of Macroeconomics*, vol. 1B, pp. 1051-1135.

Sahm, Claudia R., Matthew D. Shapiro and Joel Slemrod. 2010. "Household Response to the 2008 Tax Rebates: Survey Evidence and Aggregate Implications," *Tax Policy and the Economy*, vol. 24, pp. 69-110.

Shapiro, Matthew D., and Joel Slemrod. 2003. "Consumer Response to Tax Rebates," *American Economic Review*, vol. 93, no. 1, pp. 381-396.

Shimer, Robert. 2009. "Convergence in Macroeconomics: The Labor Wedge," *American Economic Journal: Macroeconomics*, vol. 1, no. 1, pp. 280-297.