Asset specificity, labor market outcomes, and policy preferences

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Abstract

Asset specificity is a central element in two recent and influential theoretical models of inequality and political economy: Varieties of Capitalism (VoC) and Class as Employment Relations (CER). Despite the centrality of asset specificity, measurement of the concept is not well developed. In this paper, I empirically examine the micro foundations of the VoC model. On the basis of Swedish survey data (LNU), with uniquely wide and precise measurement of skills, I develop indicators of asset specificity along three dimensions: education, occupation, and on-the-job training. Previously reported micro-level empirical support for VoC does not survive closer scrutiny in the form of validity assessment and improved model specification. Policy preferences are shaped by the reinforcement of labor market rewards and risks tied to general rather than specific skills. Inequality and political interest formation are driven by class, in its skill-based form, while dependence relations connected to asset specificity are relatively unimportant.

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Introduction

Does the welfare state emerge as a rational solution to collective action problems of skill formation? Or are redistributive policies rather the contingent outcome of long-term and gradual class struggle? Current research on this issue revolves around the theoretical notion of asset (or skill) specificity. This concept, emanating from the economic literature on organizations and labor markets, occupies a central place in two recent and highly influential perspectives on inequality and political economy: the Varieties of Capitalism (VoC) perspective (Hall and Soskice 2001, Estevez-Abe, Iversen and Soskice 2001) in political science and the Class as Employment Relations (CER) perspective (Goldthorpe 2000) in sociology. The latter model – which provides the theoretical rationale for the major conception of class in sociological research [1] – has recently been put to empirical test and conspicuously failed (see Tåhlin 2007). My purpose in the present paper is to empirically evaluate the Varieties of Capitalism theory of skill specificity as a major determinant of policy preferences via the enhancement of labor market risks. I find that previously reported micro-level empirical support for the VoC theory (Iversen and Soskice 2001, Cusack, Iversen and Rehm 2006) does not survive closer scrutiny. Policy preferences are shaped by the reinforcement of labor market rewards and risks tied to general rather than specific skills. Inequality and political interest formation are driven by class, in its skill-based form, while dependence relations connected to asset specificity are relatively unimportant. In combination, the negative outcomes of the tests of Goldthorpe's (2000) class theory and of the Varieties of Capitalism perspective imply that the reliance on asset specificity mechanisms in explanatory models of inequality processes and policy preference formation is a theoretical *cul-de-sac*. The way out is to acknowledge the central role played by the level of skills, i.e., their general amount, rather than their specificity.

The paper is organized as follows. I start with a brief overview of the literature on asset specificity. I then turn to a respecification of the main empirical model in the Varieties of Capitalism perspective for assessing the impact of skill specificity on policy preferences, concluding that the notion of asset specificity needs to be broadened in order to provide a reasonably comprehensive picture of the role of specific skills for labor market inequality and political preference formation. Some conceptual considerations follow, before describing the data and defining the variables to be used in the main empirical analysis. The empirical findings – based on the Swedish Level of Living Surveys – are reported in four steps, moving from the skill determinants of rewards and risks, through preference formation to the overall pattern of inequality and micro-level political economy. I close with some conclusions and a discussion of the findings.

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[1] The Goldthorpe class schema is also known as EGP (Erikson, Goldthorpe and Portocarero 1979). A recent presentation of the model for a non-sociological audience is Erikson and Goldthorpe (2002). The latest version of the EGP schema is called ESeC (see Rose and Harrison 2007).

Asset specificity: a brief overview of the literature

The essence of the concept of asset specificity is that the productivity of an asset – such as a skill – may vary with the context in which the asset is used. Completely general assets (or skills) are equally useful (productive) in all contexts (e.g. firms, industries or occupations), while specific assets are more useful in some contexts than in others. When asset productivity is context dependent, the actors involved in using the asset (e.g. a worker and an employer) tend to develop ties to each other that are stronger than in the case of context-free (general) asset productivity: each party involved in asset specific exchange is at risk of losing value (wages or profits) if the tie is broken (by the other party or through some external cause) since alternative transaction partners (of equal or higher value) are in relatively short supply. Typically, then, reciprocal dependence relations between the parties emerge.

An early example of asset specificity from the economic literature is Adam Smith's (1776) analysis of the division of labor. The breakup of the labor process in specialized tasks improves the worker's dexterity in each task, but this rise in individual productivity does typically not carry over to other tasks (cf. Gibbons and Waldman 2004). The modern literature on human asset specificity is focused not on tasks, but on employers, by making the distinction between general and firm-specific on-the-job training (OJT). This distinction was briefly introduced by Marshall (1920) but was not systematically examined until Becker's (1962) analysis of investment in human capital. From a slightly different angle, Williamson (1971) and Klein, Crawford and Alchian (1978) extended some insights of Coase (1937) by identifying asset specificity as an important determinant of contract (e.g., employment) design. That observation became an important ingredient in the development of transaction cost economics (TCE), as spelled out in Williamson (1975).

Coase's (1937) classical article on "The nature of the firm" asked the question why market transactions, such as buying and selling labor power, does not exclusively consist of spot contracts, i.e., the short-term exchange of commodities for money. In other words, why are there such entities as firms, with more long-term internal transactions between employers and workers, if all exchange can be carried out efficiently in the external market? Coase's answer was that it sometimes is costly to rely completely on the price mechanism. These costs are called transaction costs. They consist of expenses for acquiring information on available alternatives, reaching agreements with a chosen partner (buyer or seller), and ensuring that these agreements are kept in a satisfactory manner. At some point, these costs reach a level that makes it more efficient to organize the transaction on a more long-term and regulated basis. One form of such more stable relationships is the firm, with employment contracts that have some duration beyond the completion of an immediate task. Williamson (1971) identified asset specificity as one important source of transaction costs: replacing a lost transaction partner is more expensive (time consuming etc) if the asset of interest is specific rather than general because specific assets are more difficult to replace in a satisfactory (equally productive) manner than general assets are. Both the buyer and seller would therefore gain by reaching an

agreement involving some guarantee of a mutual long-term relationship. As spelled out below, this line of reasoning is closely related to the implications of Becker's model of general versus firm-specific on-the-job training.

In the Varieties of Capitalism perspective, the rise of the firm as a response to market failure is extended to the rise of the welfare state, by analogous reasoning: social policies emerge due to rational attempts by both employers and workers to safeguard the productive use of specific assets. For the employers, such policies primarily consist of skill formation: ensuring the supply of skilled workers, via education and training, within an acceptable system of investments (cost distribution). For the workers, the policies of interest include (apart from skill acquisition) employent protection, unemployment protection, and coordinated wage determination. These policies protect workers from the risk of income loss if employer demand for their specific skills falls, while employers are protected from the risk that the supply of the specific skills they rely on in their production falls.

The Class as Employment Relations perspective does not extend the TCE reasoning beyond firms, but within firms: long-term employment contracts based on mutual interests of employers and workers to safeguard the productive use of specific assets are efficient in the case of some employees in a firm but not for others. Where such contracts are relevant, service relations arise, the name implying that special services in the employer's interest are carried out by the employees. The main benefits of the service relation for the worker is employment security and upward-sloping internal career-wage profiles, while the employer gains the worker's long-term commitment to the firm. The opposite of the service relation is the labor contract, defined as a spot market, i.e., the short-term exchange of clearly delimited task execution for money without prospects of future recurrency. These two polar cases – the service relation and the labor contract – define the end points of the structure of social class among employees, i.e., professionals and high-level managers (the service class) at one end and routine manual or non-manual workers at the other end. Asset specificity is one of two drivers of contract form; the other is uncertainty (in line with Williamson's TCE conception), defined as difficulties in monitoring the execution of job tasks (i.e., a kind of transaction cost).

Hence, while the Varieties of Capitalism (VoC) model singles out workers with high levels of asset specificity as strongly supporting welfare state policies and income equality, the Class as Employment Relations (CER) model identifies such employees as the upper social class, a group of voters who typically oppose welfare state expansion and wage compression. This appears paradoxical, and indicates that the two models, despite building on similar theoretical premises, are incompatible with each other. However: VoC compares specific assets with general assets, and sees specificity risk; CER compares specific assets with no assets, and sees specificity benefits. While both are right, they are also wrong: a contract between workers and employers based on firm-specific assets is a trade-off (equality) state, not a power (inequality) state. A trade-off state would not seem to be a promising candidate as the basis for a theory of inequality. A better basis for such a theory is *reinforcement* of

risks and rewards, i.e., with high rewards and low risks at one end, and low rewards and high risks at the other end, in line with e.g. the power-resources approach (PRA) of Korpi (1974, 1985, 2006).

The Becker model of on-the-job training

Market failure in skill formation is a central feature in the Varieties of Capitalism perspective. Pigou (1912) introduced this notion by claiming that the rate of on-the-job training in a competitive labor market is bound to be sub-optimally low due to the unwillingness of employers to pay for skill formation among their employees in the face of poaching risks: other employers might recruit the trained workers and so reap the productivity benefits of employee skills without having to pay for the training investment: "'(S)ince workpeople are liable to change employers … socially profitable expenditure by employers in the training of their workpeople … does not carry a corresponding private profit.' In this view, firms face a collective action problem – a 'poaching externality'. They are better off if they can draw from a pool of skilled workers, but either the fear that other firms will 'poach' their workers or the hope that they themselves can engage in poaching leads them to refrain from investing in training. The outcome is a workforce that possesses a suboptimal level of skills" (Bowman 2005: 570, including the Pigou citation).

By emphasizing the distinction between general and firm-specific training, which Pigou had ignored and Marshall identified but not followed up, Becker (1962) showed that general training would occur through worker – but not employer – investment while specific training would occur through joint investment by employers and workers. Employers will not pay for general training because general skills are equally useful at other firms, and hence the training firm is at risk of being poached, while they will pay for specific training because firm-specific skills are – by definition – not equally useful at other firms. They will not pay the full cost of specific training, however, since if the worker quits after training the employer's investment is lost. Workers will pay for general training because general skills raise their productivity at all firms, and they will pay for specific training because it raises their productivity in the current firm. But they will not pay the full cost of specific training, for reasons converse to the employer case. Specific training investments are thus shared, and so create bilateral dependency between employers and workers.

The expected outcome for workers is a set of distinct wage-time profiles and separation probabilities dependent on the amount and kind of on-the-job training. The wage profile is flat for workers who do not receive training (due to constant productivity) and upward sloping for those who do. The upward wage slope is steeper for general than for specific training, because workers pay for all general training (through low wages while training compensated by high wages after completed training) but for only a fraction of specific training. The probability of separation is relatively low for workers with specific training but does not differ between untrained and generally trained workers. The reason for the comparatively strong attachment between employers and workers with firm-

specific skills is that (a) the workers are paid more in the current firm than they would be at other firms, since their productivity is higher in the current firm than elsewhere, while (b) the current employer is paying less for the workers than their productive value due to the shared investment and resulting wage-time profile (the worker did not pay the full cost of training in the specific case, and therefore does not receive the full returns to the resulting increase in productivity).

So in equilibrium, the risk of income loss would seem to be the same for untrained (U), generally trained (G) and specifically trained (S) workers: the risk of lay-off is lower for S than for U and G, but given a lay-off, the risk of income loss is higher for S than for U and G. There appears to be no theoretical reason to expect that the product of these two risks differs across the three skill categories. It is in this sense that the Varieties of Capitalism (VoC) model of risks connected to specific skills appears unbalanced (while the Class as Employment Relations (CER) model of benefits associated with asset specificity appears unbalanced in the other direction). Rewards and risks trade off in the Becker model, but not in the VoC or CER versions of the asset specificity argument.

The empirical results below will indicate that the trade-off model is supported, and therefore asset specificity – at least in its firm-centered version – does not seem well suited as the basis for a theory of inequality. Before turning to the main empirical analyses, however, I examine the specificity measure and model specification that the Varieties of Capitalism perspective has so far used as the basis for its claims of empirical support.

Skill specificity and policy preferences: respecifying the VoC empirical model

The main micro-level measure of skill specificity in the VoC literature is largely based on occupational characteristics (from ISCO, i.e., the International Standard Classification of Occupations). This is rather surprising, given the theoretical emphasis on *firm*-specific skills (even if firm specificity is not claimed to be the sole dimension of importance). At any rate, the measure used is the following: ”(W)e can exploit the skill-based hierarchical structure of ISCO-88 to capture the specialization of workers’ skills … by comparing the share of unit groups in any higher level class to the share of the workforce in that class. The logic is that the number of unit groups in any higher level class will be a function of (1) the size of the labor market segment captured by that class and (2) the degree of skill specialization of occupations found in that particular labor market segment. For example, 8 % of the workforce across our countries is classified as ’plant and machine operators and assemblers’ (major group 8), but this group accounts for 70 of the 390 unit groups, or 18 %. … By dividing the share of unit groups (.18) by the share of the labor force (.08), we can generate a measure of the average skill specialization within that particular major group” (Iversen and Soskice 2001: 881). This is taken as a measure of absolute skill specificity. But ”(b)ecause the theoretical concept of skill specificity is a relative variable, the final step is to divide the absolute skill specialization measure, *s*, by the ISCO measure of the level of skills. … Alternatively, we can divide *s* by a proxy for people’s

general skills, *g*, which gives us a measure for *s/g*. … The proxy for *g* that we use is the respondent's highest academic degree" (ibid.). In practice, the average of these two relative measures has become the standard skill specificity measure (see, e.g., Cusack, Iversen and Rehm 2006).

Aside from the disconnection of this indicator from the notion of firm-specific skills, note the rather complex nature of the suggested measure. It is less than fully transparent from the description above what kind of information is actually picked up. A simpler way of expressing it is this: absolute skill specificity is actually *occupational smallness* (inverted number of incumbents). From the verbal description above, this may not be readily evident, but can be seen through inspection of the Excel spreadsheet that Iversen has made available on his website.[2] It is an identity that VoC does not seem to have been aware of at the time of writing, since it is never mentioned or used in the relevant publications, nor on the website. At any rate, if occupational smallness is to be taken as underlying labor market risk (following the logic of the skill specificity argument in its VoC version), it would seem to mean that incumbents of small occupations face a scarcity of demand for their labor in the market. But scarcity is a market outcome, i.e., of supply relative to demand. A count of realized matches between supply and demand, which is what the measure is based on, does not reveal if supply and demand are equal (in balance) or if one of them is larger than the other. It seems that the relation between occupational size and labor market risk is an empirical issue, which in the VoC context would mean that the impact of inverted size (even if called specificity) on policy preferences is theoretically equivocal.

Further, consider the measure of *relative* skill specificity: the ratio between occupational smallness and the average of job skill requirements and individual schooling. The denominator in this ratio is thus strongly tied to social class, which is known to be a significant predictor of both labor market conditions and policy preferences. Given the numerator (occupational smallness), the measure of relative skill specificity is therefore an inverted indicator of class: high levels of relative skill specificity indicate low levels of job skill requirements and education. To the extent that the ratio measure is estimated to have an impact on policy preferences, then, it is vital to reveal how much of this effect is due to preference differences by class. The reasonable way to do this is to split the ratio measure into its components and enter the main effects of the two elements as covariates in a regression, together with their interaction. This is not what is done in the VoC papers, however. Instead, the ratio is typically entered as a single determinant, which comes close to entering an interaction term with the main terms excluded, a procedure highly likely to produce misleading or at least obscure empirical results.[3] The standard recommendation in the methodological literature is to

[2] See http://www.people.fas.harvard.edu/~iversen/data/Measuring_skill-specificity.xls.

[3] A partial exception is a regression model in table 5 of Iversen and Soskice (2001: 888), where the ratio measure is entered together with a control for individual education. This solution is only partial, since (a) the denominator of the ratio includes job skill requirements as well as individual education, so both of these should be controlled for, (b) the numerator ('absolute skill specificity' or occupational

always include the constitutive elements of interaction variables in the specification of the regression model, because the impact of the elements (the main effects) and their product (the interaction effect) should be interpreted jointly, i.e., as a package (see, e.g., Brambor, Clark and Golder 2006).

Table 1 shows how the above issues play out in practice. The outcome variable is preference for equality (supporting income redistribution from high to low income groups). In the VoC literature, this kind of preference is believed to be strongly and positively affected by skill specificity, presumably due to labor market risk considerations. Empirical support for this hypothesis is reported in Iversen and Soskice (2001) and Cusack et al. (2006), based on a significantly positive effect of the above measure of relative skill specificity. The first model in table 1 shows the simple bivariate relationship between the ratio measure of skill specificity and preference. Although not strong, the association is indeed significantly positive, in line with VoC expectations.

In model 2, the main effects of 'specific skills' (in fact occupational smallness) and 'general skills' (the average of job skill requirements and individual education, measured as years of schooling required and achieved, respectively) are added to the equation. As expected, the impact of the class related factors ('general skills') is strongly negative. Interestingly, the effect of 'specific skills' (occupational smallness) is also strongly negative, implying that small occupations are associated with favorable rather than adverse labor market conditions (we return to this issue below). Of course, this is the opposite of what VoC claims. The finding indicates that either the measure of (absolute) skill specificity is invalid or the VoC central hypothesis is wrong, or both. But note further that the ratio measure ('relative skill specificity') is still significantly positive, indeed more strongly significant than in the previous (bivariate) model. This implies that there is a significant interaction between 'specific' and 'general' skills which needs to be examined.

Model 3 contains both main and interaction effects. For the purpose of clarity, the effect of 'specific skills' is reported separately by three levels of 'general skills' (which are entered as two dummy variables in the regression to capture main effects). The interaction pattern shows that the impact of 'specific skills' on policy preferences is negative but not significant for workers with low 'general skills' and significantly negative for workers with medium or high 'general skills'. So while the gradient of the impact of absolute skill specificity along levels of general skills is as predicted by VoC (i.e., that workers with high specific but low general skills are more positive to income equality than workers with high specific as well as high general skills), the direction of the effects is wrong. It is not that workers high on relative skill specificity are strongly positive to income redistribution. Rather, workers high on skill specificity who are also high on general skills are strongly *negative* to income equality, while the high specific-low general skills workers (the strong welfare state supporters in the VoC account) are on average *indifferent*.

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smallness) should also be included as a covariate, and (c) given (full) inclusion of both main effects (a and b), the interaction term should be entered as a product rather than a ratio.

In sum, the picture emerging from the analysis of table 1 is very different from the theoretical claims and previous empirical tests of the VoC perspective. First, the measure of absolute skill specificity appears to be of dubious validity. Second, in the previous literature the measure of relative skill specificity has been entered into regression models that seem to be misspecified. Third, with more reasonably specified models, the estimated associations between skill specificity (still invalidly measured) and policy preferences provide essentially no support for central VoC hypotheses.

Measuring skill specificity: conceptual considerations

The analyses in the foregoing section is only the beginning of the empirical story, however. To properly evaluate the VoC micro level model, it is necessary to broaden the view of what skill specificity might mean. An important reason for the negative findings above is that relevant data on skill specificity are hard to find; it is thus perhaps not surprising that the measure of relative skill specificity does not seem to work well. Given the options at hand, it may be seen as a rather creative solution of a measurement problem. Nonetheless, the results of table 2 strongly indicate that alternative measures are needed.

There are two main components of skill formation: education and on-the-job training (OJT). Skills can either be generally useful or specific along (at least) three dimensions: occupations, industries and firms. The first two of these may be relevant to consider in the case of education while all three may be relevant in the case of OJT. In what follows, I apply a wide perspective by including five dimensions of specificity: (a) occupational specificity of education, (b) firm specificity of experience, (c) firm specificity of on-the-job training; (d) occupational smallness (the main VoC micro measure in practice, if not in theory), and (e) industrial specialization of occupations (Tristao 2007), which is closer to the intention of the VoC measure (an indicator of the dispersion of external demand, i.e., availability of alternative jobs in the event of downturns in current industry).

I look at three main labor market outcomes of skills: wage level, wage change, and unemployment. For each of these I compare the impact of skill components (education and OJT) and skill specificity (by occupation for education, by firm for OJT and by smallness and industry for occupation).

It is important to jointly estimate the impact of education (of the individual) and educational requirements (of the job). The standard approach to do this is the ORU model, originally due to Duncan and Hoffman (1981) and subsequently used by many others (see the overview in Rubb 2003). In the ORU model, education is decomposed according to the equation AE = RE + OE – UE, where AE denotes attained education, RE is the required amount of education in the job that the worker holds, OE is the amount of education attained by the worker that is in excess of what the current job requires, and UE is the amount of education required by the job that is in excess of what

the worker has attained. This decomposition combines the information on attained and required education while fully retaining the continuous character of both dimensions. This allows an assessment of separate payoffs to years of attained education dependent on the nature of the job match as revealed by earnings (or other rewards) regressions. In the analyses below, I follow the ORU model, but split the matched component in two parts, general and specific education.

Data and variables

The data used are from the Swedish Level of Living Surveys (LNU) 1991 and 2000. At each occasion, a national probability sample of about 6,000 adults (18-75 years) residing in Sweden were interviewed (by personal visits) about their living conditions along several dimensions, such as education, working conditions, health, housing, and family life. The non-response rate was 20.9 percent in 1991 and 23.4 percent in 2000. The samples have a panel structure, such that all individuals in the sample at time-point 1 are included in the sample at time-point 2 if still within the targeted age range and residing in Sweden. New members of the sample are drawn at each time-point, entering either through age or immigration. (For more information on the surveys, see, e.g., Jonsson and Mills 2002.) The subsamples used in the analyses below consist of employees age 19-65 working at least 10 hours per week. In the cross-section from 2000 the sample used contains around 3,000 individuals, while the 1991-2000 panel has around 2,000 individuals (employees at both occasions, age 19-56 in 1991, 28-65 in 2000).

The choice of data is motivated by the LNU surveys' inclusion of an unusually (perhaps uniquely) detailed set of items that are relevant for measuring skills and asset specificity. There are two main examples: First, the questions on OJT include not only information on the amount of required training (equivalent to the 'specific vocational preparation' (SVP) item in the United States and elsewhere), but also an indicator of the degree of firm specificity of the acquired training. Second, the questions on employment options outside the current firm include not only an indicator of the worker's options, but also an indicator of the employer's options. This combination allows a simultaneous consideration of supply and demand, which should be useful – if not crucial – in assessing labor market rewards and risks. Two further important advantages with the LNU data are their longitudinal (panel) structure and their match with micro-level register data, both of which help improve the precision of the analyses.

A reasonable question regarding the choice of data is whether empirical results for one country are sufficiently relevant when evaluating the Varieties of Capitalism perspective in view of its internationally comparative focus. Here it is important to distinguish between the micro and macro levels of analysis. The cross-national comparisons in the VoC framework are macro-level in character, while the micro-level foundations of the theoretical model are expected to hold in all countries. In other words, the associations between skill specificity, labor market risks, and policy preferences are

seen as international constants in the VoC model. The international variability is expected to occur in the values of these three factors, not in their covariation. In fact, these two parts of the model presuppose each other: due to a constant (micro-level) pattern of associations between factors, differences in (macro-level) factor values covary, so that a low level of skill specificity (in a particular country or type of country) goes together with a low level of support for egalitarian welfare state policies (in that country), and so on. My analytical purpose in the present paper is to evaluate the micro-level associations among factors, not the international pattern of macro-level factor values. For this purpose, the essential data requirement is high precision in factor measurement rather than cross-nationally comparable information.

Variable definitions

Asset specificity dimensions

Education: The amount of education is measured by the number of years of full-time education beyond compulsory school. Educational specificity is measured by the field of the highest education attained. If this field is specific enough that it may be determined whether or not it matches the current occupation held (following the procedure in le Grand et al. 2004), the respondent's education is coded as occupation-specific; otherwise it is coded as occupation-general. Note that occupation-specific education is much more common than general education (compare the means of general and specific education in table 2 below, which contains descriptive statistics for all variables used in the paper).

General on-the-job training (OJT): the amount of training (formal and/or informal) in the current job that is useful with other employers. The indicator is constructed by multiplying two interview items, (a) and (b), where (a) is the response to the question "Apart from the competence necessary to get a job such as yours, how long does it take to learn to do the job reasonably well?" and (b) is the answer to the question "Do you know of any employers where you would have good use for what you've learnt in your present job?". The response alternatives to (a) are '1 day or less', '2-5 days', '1-4 weeks', '1-3 months', '3 months-1 year', '1-2 years', and 'more than 2 years', recoded to number of months, where the top code is 36 (or 3 years). The response alternatives to (b) are 'Yes, many', 'Yes, some', 'Yes, one or two', and 'No', recoded to 1, 0.7, 0.3 and 0, respectively. The resulting variable is coded in years.

Specific on-the-job training: the amount of training in current job that is not useful with other employers. Constructed the same way as General OJT (see above), but with a reversed coding of item (b), such that 1=0, 0.7=0.3, 0.3=0.7, and 0=1. Note that, in distinction to education, most OJT appears to be general rather than specific (compare the means of general and specific OJT in table 2 below.)

Experience: number of years in gainful employment. Usually taken as an indicator of general (with respect to the firm) on-the-job training.

Seniority: number of years spent with current employer. Usually taken as an indicator of firm-specific on-the-job training.

Occupational smallness: the inverted average size (number of persons) employed in ISCO 4-level occupations within the respondent's ISCO 2-digit occupation. This measure is identical to 'absolute skill specificity' in Iversen and Soskice (2001) and Cusack et al. (2006). To arrive at a measure of 'relative skill specificity', in line with the cited VoC papers, the occupational smallness indicator is interacted in the regression models with general and specific education. Information on occupational size is taken from the 1990 Swedish census (FoB) containing complete population counts (N = 4,077,997).

Occupational specificity: the coefficient of variation (COV=SD/mean) of the distribution across 44 industries among incumbents of ISCO 4-level occupations (one COV for each of 336 occupations). A high COV implies high industrial concentration of occuaptional employment. This measure is a variant of an index of labor market risk suggested by Tristao (2007), the rationale being that industrial concentration increases vulnerability to shifts in labor demand. As with occupational size, the information on occupation by industry employment distributions is taken from the 1990 Swedish census (complete population counts, N = 3,652,329).

Labor market outcomes

Wage: the sum of earnings in current job during a specific time period (usually one month) divided by the number of hours worked during the same period. Logged.

Wage change: difference in (ln) hourly wage between 1991 and 2000.

Wage loss: <= percentile 20 of the wage change (1991-2000) distribution.

Individual unemployment: number of days with unemployment benefits from 1992 tthrough 2000 for each individual in the panel data set 1991-2000. Information from population registers.

Other variables

Educational requirements: the required amount of education in the worker's current job, according to the respondent's own assessment. The variable is based on two interview questions: (a) "Is any schooling or vocational training above elementary schooling necessary for your job?". (Yes – No.) (b) "About how many years of education above elementary school are necessary?" (Number of years, ungrouped.)

Excess educational requirements: number of years of required education in current job in excess of attained education.

Excess education: number of years of attained education in excess of required education in current job.

Bilateral dependence: indicator of dependence between workers and their employers (as perceived and reported by survey respondents). The indicator is based on the following two interview questions. a) How difficult do you think it would be for your employer to replace you if you left? b) How difficult do you think it would be for you to get a job as good as your current one if you for some reason had to leave your employer? Question (a) may be seen as indicating supply of workers of the respondent's kind, while question (b) may be seen as indicating demand. There were five response alternatives to both questions: 1='very difficult', 2='fairly difficult', 3='not especially difficult', 4='fairly easy', and 5='very easy'. The definition of bilateral dependence is the sum of (a) and (b). (For further discussion and validation, see Tåhlin 2007.) This scale may be seen as running from markets to hierarchies, in the sense of Williamson (1975), or from the labor contract to the service relation (Goldthorpe 2000; cf. Tåhlin 2007).

Class. Six EGP classes (I = professionals, administrators and managers; higher-grade; II = professionals, administrators and managers; lower-grade; and higher-grade technicians; IIIa = routine nonmanual employees; higher-grade; V = lower-grade technicians, supervisors of manual workers; VI = skilled manual workers; and VII/IIIb = nonskilled manual workers and routine nonmanual employees, lower-grade; see, e.g., Goldthorpe 2000) are entered as five dummy variables in regression models with wage level, wage loss, and unemployment risk as outcomes. The predicted values from these regressions are then combined to one continuous variable (mean=0, sd=1) by factor analysis, with class I at the high end and class VII/IIIb at the low end. (The construction is highly robust to alternative specifications, including *a priori* rather than regression based class scores. The correlations involved generally exceed 0.95.)

Preference for equality: the attitude toward policies that attempt to reduce income inequality in the population. Responses to the interview question ”I’m now going to present a few ideas about different kinds of societies, which some people think we should pursue in Sweden in the future. I’d like to know what you think about these ideas. … What do you think of the idea of attaining a society with small income differences?” There were five response alternatives, from 1=’very good idea’ to 5=’very bad idea’. (The measure used below has been coded in reverse, from less to more supportive of income redistribution.)[4]

Empirical results

Analytical strategy

The analytical strategy of the empirical analyses below is the following. A basic assumption is that in examining the relationships between skills, labor market outcomes, and policy preferences, both rewards and risks in the labor market need to be considered. Previous research, e.g. in the VoC tradition, strongly indicates that rewards (such as income) as well as risks (of reward loss) affect policy preferences, even if the VoC theoretical model tends to emphasize the risk dimension. In a first step of the following analyses, the association between skills and labor market rewards in the form of (current) wage level is estimated. In a second step, I estimate the influence of skills on labor market risks, of which I consider two: exits from employment to unemployment and relative wage loss. In both risk cases, the time period is 1991-2000 (i.e., the time between the two most recent LNU surveys). Step three is a regression of policy preferences on labor market rewards and risks, to evaluate the above assumption that both labor market factors have a significant impact, such that low rewards and high risks are associated with support for redistribution. Further, the total relationship (regardless of the mediation by labor market conditions) between skills and policy preferences is examined, with the purpose of comparing the total preference impact across the separate skill dimensions. Step four, finally, brings all the elements under consideration – skills, rewards, risks and preferences – together

[4] As Kenworthy and McCall (2008: 39) note when using a similar measure from the International Social Survey Program (ISSP), there are two key pieces of information missing from this kind of indicator. First, the amount the respondent would be willing to pay (in taxes for example) for redistribution is not taken explicitly into account. Second, the reference point is not known, so the extent to which the respondent is satisfied with the current level of inequality is not clear. Hence, the measure is far from perfect, but should nonetheless work reasonably well. In particular, it is implausible that the pattern of correlations between this indicator of policy preferences and other individual traits would change by shifting indicators in a way that would alter any main conclusion of the empirical analyses. With more precision along the lines just indicated, the general magnitude of the correlations would probably be higher in an absolute sense, but there is no strong reason to expect that this difference in strength would vary across the dimensions of interest in the present case (such as different skill categories). In any event, as Kenworthy and McCall (2008) point out, there is typically no superior measure available in data sets containing other variables needed in political economy analyses.

in a factor analysis in order to summarize the overall pattern of inequality. The conclusion is that there are two basic dimensions of labor market inequality, of which only one is important for preference formation. And it is not the one expected by VoC.

Step 1. Labor market rewards: wage level

The outcome variable in the cross-sectional (LNU 2000) regression in Table 3 is the log of hourly wages, with the full set of general and specific skills as predictors. Beginning with the first specificity dimension, *Experience*, we see that general experience has a strong positive and diminishing (the square term is negative) wage effect that is well-known from the human capital literature. In contrast, *Seniority* (experience specific to the current firm) has no significant impact. Turning to the education variables, strong signs of asset specificity are evident, as expected. The economic payoff to schooling is highly dependent on the educational requirements of the job held, in line with a large amount of previous research based on the ORU model. An interesting novelty of the design of this regression is the separate estimates for general and occupation-specific education. The economic returns to the two forms of schooling appear to be roughly equal. Both types of matched schooling give much higher returns than do either of the components (educational requirements and education) in isolation. Next, consider on-the-job training. General OJT gives a large wage payoff, larger than education per year (but recall that the average number of years in OJT is clearly smaller than the average number of years of schooling; cf. the descriptive overview above). Firm-specific training, by contrast, appears to have a negligible payoff in contemporaneous wages.

In sum, the three dimensions of experience, education and training all have a large impact on current wages. For experience and training, the general components are economically important, while the firm-specific components are not; in fact, the latter are close to zero. For education, the economic payoff is strongly context-dependent, in the sense of being specific to the skill level of the job held. In contrast, the distinction between general and occupation-specific schooling appears to be of little consequence for wage attainment.

The fourth dimension of specificity in table 3 is the indicators on absolute and relative skill specificity established in the VoC literature. In connection to the analyses in table 2 above, it was shown that absolute specificity in the operational VoC sense, in fact occupational smallness, had an impact on policy preferences in the opposite direction of VoC expectations. This was a sign that perhaps occupational smallness would be positively associated with labor market rewards and negatively related to labor market risks, in clear contrast to the VoC model. And (inverted) occupational size does actually have a strong positive association with current wages, as shown by the table 3 results, thus indicating that small occupations (relatively few incumbents) have a substantial wage bonus, given all other skill factors in the regression. The effects are shown separately for three skill level groups (’general skills’, i.e., job requirements and individual schooling combined, as in

table 2), in order to evaluate the VoC claim that 'relative skill specificity' is crucial for labor market outcomes. For all three skill groups, the wage impact of occupational smallness is positive and strongly significant, with the effect being slightly larger in the highest skill group. This result is quite remarkable: the VoC analyses appear to – almost by accident – have discovered a rather powerful hitherto neglected dimension of labor market rewards. As far as I know, occupational size has not been included *as such* in any previous wage regression in the literature. Its positive impact on wages is not necessarily incompatible with VoC, since the theoretical model is focused on risks rather than rewards (although both are acknowledged as important for policy preferences). The positive wage effect is compatible with the weberian notion of closure, in the sense of restricted labor supply to keep the price level (wages) high. Direct measures of occupational closure have been shown empirically to have substantial wage effects (see Weeden 2002 for the US). But just as the number of realized matches cannot reveal demand scarcity (as in the VoC model) it cannot reveal supply scarcity (as in the closure model). An alternative interpretation of the smallness effect is that strong specialization indicates high ability (as in the model of Neal 1998). On the demand side, small occupational size may also indicate strategic importance in the work organization. But obviously these are mere speculations; further analyses are needed before any particular interpretation can be seen as supported. Given the size of the effects involved, such work appears well motivated (but is beyond the scope of the present paper).

Finally, the alternative measure of occupational specificity – industrial concentration – has a significantly negative but diminishing (the square term is positive) impact on wages. Accordingly, this measure seems to work better than occupational smallness as an indicator of weakness or vulnerability in the labor market. This is consistent with the empirical analyses for the US by Tristao (2007), who first suggested the measure. In this sense, the indicator might be a better candidate than the one used so far by VoC in tapping the specificity aspects they are interested in. Still, of more relevance than rewards in this context are labor market risks, to which we now turn.

Step 2. Labor market risks: wage loss and unemployment

In Table 4, the skill determinants of labor market risks are considered. The first risk indicator is wage loss, defined as being in the bottom fifth of the wage change (1991-2000) distribution. All of the workers in this segment have suffered a loss in relative wages, and almost half of them (nine percent of the panel sample) have also seen a fall in (real) absolute wages. Some of the wage loss may be tied to intervening unemployment, but we disregard mediating mechanisms here, and consider unemployment later (in a seperate model of the table). A special issue regarding wage loss concerns the role of initial (time 1) wages. All else equal, the level of initial wages will strongly increase the risk of wage loss, due to regression to the mean. How best to deal with this fact when estimating change models is not a settled issue in the methodological literature. Here, I have chosen the following procedure. I start with a logistic regression of wage loss, including initial wage as a covariate. I then

run an OLS regression of the predicted value from the first regression, with initial wage as single predictor. In a third stage, I run an OLS regression of the residual from the second regression. This is the model reported in table 4 (column 1). The purpose of first including initial income is to take care of the regression to the mean effect, while subsequently excluding initial income is motivated by validity concerns: a wage risk measure strongly and positively correlated with wage level would appear to be more of a statistical construction than a substantively meaningful indicator. And indeed, both obvious alternatives (disregarding initial income completely or incorporating it completely) produce results of clearly inferior face validity relative to the chosen procedure (these results are not included in the present version of the paper).

The results of the wage loss model (designed as just described) in table 4 are distinctly different from the wage level model above. First, firm-specific experience (seniority) has a stronger effect than general experience, with opposite signs. The strong seniority effect is negative, and thus implies that, given other factors in the model, relative wages are unlikely to fall for workers who have been with the same employer for a long time. Most of this effect is probably due to a low probability among high-seniority workers to change employer, in combination with a low probability to suffer a wage loss within the firm. The general experience effect is positive (risk enhancing) and increasing (the square term is also positive), in line with the negative square term in the wage level equation (decreasing relative wages at high experience levels, on average).

The pattern of education effects on the risk of wage loss implies that general education is the most protective schooling factor, while occupation-specific schooling and over-schooling (relative to the job requirements at time 1) have weaker but still large protective effects. In contrast to the wage level case, the impact of educational job requirements unmatched by individual education (under-education at time 1) is not significant. Hence, it seems that individual education (especially general) rather than job requirements is the decisive factor in protection against wage risk.

In contrast to education, on-the-job training significantly increases the risk of wage loss. This is especially the case for firm-specific OJT. These effects need to be seen in conjunction with the strong wage protection offered by seniority. In particular firm-specific OJT is positively correlated with seniority. Net of this, training increases wage loss risk, presumably in connection with employer shifts. This net effect is in line with standard asset specificity arguments on context-dependent productivity, at least in the firm-specific case (which is also the stronger effect). That the risk enhancing net effect of general OJT is also significant implies the presence of non-negligibile shift costs even in the general case, in line with models of training in imperfect labor markets (see, e.g., Acemoglu and Pischke 1999).

The pattern of occupational smallness effects is highly interesting in relation to the VoC model. In stark contrast to VoC expectations, small occupations are significantly *risk reducing* rather than risk enhancing. Further, this is true for all three skill levels, but the risk reduction clearly rises with the level of ’general skills’. Again, given this pattern of effects, note what would happen if the

VoC measure of ’relative skill specificity’ would be applied in this model: it would appear as if ’specific skills’ were indeed a strong risk enhancing factor, when the opposite is actually true (in the case of this dimension of specificity). Only by including both main and interaction effects of the measures components are the associations properly revealed. The pattern that surfaces also further helps explain why occupational smallness is associated with policy preferences in the opposite direction from expected by VoC. Not only do small occupations increase economic rewards, they also – and this is of particular theoretical relevance with regard to the VoC model – reduce the risk of reward loss. The connection with low support for redistributive policies is hence not surprising.

Finally, occupations with a high degree of industrial concentration strongly increase the risk of wage loss. This finding further strengthens the interpretation of industry-specific occupations as an indicator of labor market vulnerability. The measure thus seems well worth exploring further in future research on these matters.

Unemployment risk is considered in the second model of table 4. The strongly negative (protective) effect of seniority replicates the wage loss finding. In the unemployment case, however, general experience also has a protection effect (although diminishing as shown by the positive square term). Once again, education reduces risk, this time about equally much for general and occupation-specific schooling. In contrast to the wage loss case, matched education has a much stronger impact than overschooling, which is not surprising: bad matches should obviously be at higher risk of dissolution. Neither of the OJT indicators has a significant impact on unemployment risk. As already underlined, however, these non-significant effects are estimated net of the strongly protective impact of seniority (with which OJT is positively correlated, at least in the firm-specific case). Occupational smallness again turns out to have a negative (protective) impact, but in the case of unemployment risk among low-skill workers only, while the effects for the other two skill groups are not significant. This is a further instance of a negative finding for the VoC model, since the workers with high ’specific skills’ (small occupations) and low ’general skills’ (i.e., high on ’relative skill specificity’) are the high-risk group *par excellence* in VoC, but are the only group of the three with significantly reduced unemployment risks according to table 4. The unemployment risk estimate for industry-specific occupations is, in contrast to the wage loss model, negative (protective) but not significant.

An overall implication of the models in table 4 is that specificity, in several of its forms, often have counteracting effects on employment loss and wage loss. Specificity is typically positive for match duration up to a point, but if the match is not continued specificity turns into a risk factor. This is the basic logic of the standard asset specificity argument. While the wage loss model contains both the stage of possible employment loss (where specificity may be an advantage) and the stage of subsequent wage loss (where specificity is more likely to be a disdvantage), the unemployment model contains the first stage only, and would therefore seem to be less weighted by negative (risk enhancing) specificity traits. In this sense, the wage loss model is the more encompassing, and wage loss is the risk dimension we focus on in the next empirical section.

Step 3. The impact of skills, rewards and risks on policy preferences

We can summarize the labor market reward and risk dimensions by estimating predicted values of the regressions in the foregoing two sections. The predicted values of the wage level regression in table 3 and the wage loss regression in table 4, respectively, correlate highly and negatively: -.53. Accordingly, rewards and risks (as connected to the skill dimensions considered) on average tend to reinforce rather than compensate each other. Table 5 shows a regression of equality preferences on these two labor market factors. As expected, both rewards and risks have a strongly significant impact, with economic rewards being negatively and economic risks positively associated with support for income redistribution. These results indicate that an explanatory model of equality preferences should focus on factors that increase rewards and reduce risks, i.e., on reward-risk reinforcement rather than reward-risk compensation (trade-off). According to standard asset specificity logic, as in Becker (1962) or Williamson (1975), that conclusion would point away from the trade-off situations governing specific skills environments. Instead, it would point toward the reward-risk reinforcement dimension of class, as in Korpi (e.g., 2006). We return to this issue in the next section.

Before then, table 6 shows the total associations between the variety of skill dimensions, on the one hand, and policy preferences, on the other. The R2 of this model is not much higher than the reward-risk model in table 5, indicating that most of the association between skills and preferences goes via rewards and risks, as might be expected. Still, the results in table 6 allow a more detailed comparison of skill-preference links along different dimensions.

Three of the five dimensions in table 6 are significantly associated with equality preferences. The first is education. Here, there is little difference between the impact of general schooling, occupation-specific schooling, and educational requirements net of schooling, while overeducation (schooling in excess of job requirements) has a slightly smaller effect. The second significant dimension is on-the-job training, where the general component is strongly negative while the firm-specific component is close to zero. Thirdly, occupational smallness (’absolute skill specificity’ according to VoC) is associated with low support for income redistribution among workers with relatively high (’general’) skills, and not significantly related to policy preferences in the low-skill group. Again, the crucial category of workers in the VoC model, with high specific and low general skills (high on ’relative skill specificity’) according to their suggested operationalization, turn out negatively for the theoretical model: these workers are – on average – *indifferent* to income redistribution.

Step 4. How does it all come together?

Let us now consider how the different pieces of the micro-level political economy puzzle fit together. For this purpose, table 7 reports the results of a factor analysis (principal components) that contains the five dimensions of skills, the three kinds of labor market rewards and risks, and the policy preferences. In addition, two crucial elements of the overall picture are added, each intended to capture the relation between rewards and risks: the first is class, assumed to be associated with reinforcement (in the Korpi sense), while the second is bilateral dependence, assumed to be associated with trade-off (in the Becker/Williamson sense). Class is measured by the standard EGP schema (converted to continuous form by regressing rewards and risks on a set of dummy variables for six employee classes, and combining the predicted values from these regressions into one; the results are very robust to alternative specifications). Bilateral dependence is the combination of two interview questions in LNU 2000 on (a) the difficulty of finding alternative employers for the worker, and (b) the difficulty of finding alternative workers for the employer; see the validity assessment of this measure in Tåhlin (2007). The dependence measure takes nine values, from low to high mutual attachment between workers and employers; see further the section Data and variables.

The analysis in table 7 contains the rotated (varimax) solution of the first two factors (principal components) in the space of variables jsut described. As can be seen, the first dimension (factor) loads (correlates) highly with the following variables: matched education and educational requirements (positively), general on-the-job training (positively), small occupations (positively), rewards (positively), and risks of wage loss and unemployment (negatively). Hence, this dimension is tied to general skills and reward-risk reinforcement.

In contrast, the second factor loads highly on the following variables: seniority, i.e., firm-specific experience (positively), educational requirements of the job net of individual schooling (positively), overeducation (negatively), firm-specific on-the-job training (moderately positively), rewards (moderately positively), risk of wage loss (positively), and risk of unemployment (negatively). This dimension thus appears to be tied to firm-specific skills and reward-risk trade-offs.

Now, how are these two basic dimensions of labor market inequality connected to class, bilateral dependence and policy preferences? The results in this respect are very clear. First, class is strongly correlated with the first dimension (general skills and inequality reinforcement) but hardly at all with the second dimension (firm-specific skills and inequality trade-offs). Second, bilateral dependence correlates positively with the specific skills factor, but not at all with the general skills dimension. Third, policy preferences (support for redistribution) are clearly associated with the general skills dimension, but not at all with the specific skills factor.

In sum, general skills and reward-risk reinforcement go together with policy preferences in a strongly class-related dimension, while specific skills and reward-risk trade-offs go together with bilateral dependence between workers and employers in a dimension that is unrelated to

both class and policy preferences. This pattern goes clearly against both inequality theories based on asset specificity – the VoC and CER models. But it supports the PRA model, based on reward-risk reinforcement and class as a main driver of political interests. It also modifies the PRA view of the micro foundation of class: this foundation is primarily tied not to employment relations, but to skills.

One further issue needs to be addressed in the VoC context: skill specificity is mainly seen as a relative factor, i.e., in relation to general skills, rather than as an absolute entity. Therefore, one should in principle attempt to combine the general and specific skills dimensions in examining the relation between skill specificity, labor market outcomes and policy preferences. In table 8, the impact of the two factors from table 7 on rewards, risks and preferences is estimated by examining both main and interaction effects. The upper panel shows effects of the factors in continuous form, while the lower panel displays the impact of categorical combinations. The VoC expectation is significantly negative interaction effects, i.e., a relatively strong impact of specificity among workers with low general skills.

Note first that the continuous interaction effects are not strong; two of them are insignificant. Second, the strongest interaction effect, which appears in the wage risk model, has the wrong sign relative to VoC expectations: the specificity effect is significantly *weaker* for workers with low general skills. Third, in the policy preference model, there is indeed a significant interaction effect in the expected (negative) direction, but it is not substantively large. Evidently, the determination of preferences for equality is strongly dominated by the general skills dimension, with little room for any impact of skill specificity, whether absolute or relative. While the crucial category ’low general skills, high specific skills’ is more supportive of income redistribution than several of the other skill categories, this is essentially an outcome of ’low general skills’ rather than ’high specific skills’. In fact, within the low general skills group of workers, the level of skill specificity makes no significant difference for policy preferences. The negative interaction effect in the model comes about due to a *negative* impact of skill specificity on equality preferences among workers with high general skills, in contrast to the *zero* impact of specificity when general skills are low. This is hardly an essential part of – or even consistent with – the VoC story.

Conclusion

Does the welfare state emerge as a rational solution to collective action problems of skill formation? Or are redistributive policies rather the contingent outcome of long-term and gradual class struggle? The empirical analyses above of the micro foundations of the VoC model suggest that the class account fits the facts better. Korpi (2006) has uncovered several weaknesses of the VoC perspective at the macro level. He points, *inter alia*, to the lack of identifiable collective actors within the framework of skill specificity and to the historical timing of major welfare reforms, especially the late emergence of unemployment insurance, which seems out of line with VoC expectations. However, he is not

sufficiently explicit as to how micro-level class relations are assumed to shape political interests and collective action. While his claim that reward-risk reinforcement is a crucial aspect of class has strong empirical support, the determinants of this reinforcement appear to be skills, not (as Korpi seems to maintain without much explicit argument) employment relations.

The emphasis on skills and skill formation as the basis of economic interest and political partisanship is a main virtue of VoC. The problem is that they have so far directed their attention to a minor rather than major dimension of skills. As shown above, it is the level of general skills rather than the degree of skill specificity that is of crucial empirical importance for the outcomes of main interest. Another attractive trait of VoC is its – sometimes spectacular – ambition to intregrate micro and macro level explanatory accounts. The findings of the present paper suggest that this integration would benefit greatly by shifting the focus from specific to general skills, and to incorporate insights from the power-resources approach (PRA). Indeed, something of this kind appears underway (see Iversen and Stephens 2008), which could be the start of a promising development. Importantly, previous empirical research shows that the distribution of skills explains only a minor part of the variation in wage inequality across countries; the major determinant is the *slope* of the skill-wage gradient (Devroye and Freeman 2001, Kenworthy 2008). This slope, in turn, is determined by institutional factors such as union density and coordinated wage bargaining (Carbonaro 2006, cf. Rueda and Pontusson 2000) that correlate highly with the political traits emphasized by PRA, such as left party cabinet shares. The role of skills hence differs markedly between the micro and macro levels, which needs to be taken into account in synthetic models.

On a more critical note, I conclude by summarizing the main empirical findings of the present exercise. First, the main micro-level indicator of skill specificity in the VoC literature thus far has a low validity, i.e., it appears to measure something different from what is claimed. It is in fact (by definition, albeit implicitly so) a measure of occupational smallness (inverted size), with effects on outcome variables (risks and policy preferences) that are either close to zero or significant in the the wrong direction relative to theoretical expectations. These effects are not visible in the VoC publications due to apparent misspecifications of the empirical models. Indeed, the lack of operational transparency in combination with misspecified regression models have led to the seemingly erroneous conclusion that the central VoC hypotheses at the micro level receive strong empirical support, when in reality the degree of support appears very low.

It is quite clear, then, that skill specificity at the empirical micro level is not what VoC has taken it to be. Instead, and this is the second main conclusion of the empirical analyses above, skill specificity is a multi-faceted – but not necessarily multi-dimensional – phenomenon. Four basic skill characteristics need to be taken into account in order to understand the variation across workers in labor market rewards and risks: (a) the education of the person, (b) the educational requirements of the job, (c) the general training content of jobs, and (d) the firm-specific training content of jobs. The mix of these four basic characteristics produces two fundamental dimensions of labor market inequality.

The dimensions can be called *general* and *specific* skills, but maybe these terms should be avoided since they have been used extensively in past research in rather inconsistent or even confusing ways. A better terminology might be *education-based* versus *firm-based* skills. While these labels do not quite capture the essence of the distinction, they do indicate the main pattern of skill formation that drives the structure of inequality. Still, I will stick to the terms general and specific skills, which requires giving them a precise meaning. Such precision is a task for future work, with some brief beginnings below.

General skills are based on learning in schools. These skills of the person are then matched to jobs that require worker skills in order to be carried out in a productive way. Most skilled jobs do not require schooling only, however, but also training on the job. This training tends to be general rather than firm-specific. Both the schooling component and the training component are strongly associated with wage rates. The economic return per year of investment tends to be at least as high for training as for schooling. This general dimension of skills is also strongly tied to occupational class measures, such as EGP or ESeC. Among employees, class and the general dimension of skills are essentially identical. Further, general skills correlate highly with occupational specialization in the sense of smallness (inverted number of incumbents), i.e., with the VoC micro level measure of absolute skill specificity. The latter finding underscores the need of revised and precise terminology.

Specific skills are based on learning in firms, i.e., on the job. This dimension is correlated with job skill requirements that are not met by education but by experience, mainly internal to the firm (seniority), and on-the-job training, mainly firm-specific. Hence, the specificity factor may be seen as an alternative route to skill acquisition, when the road of education is not used. The dimension is moderately positively correlated with economic rewards, but also positively correlated with economic risks (wage loss probability). Above all, it is strongly negatively correlated with unemployment risk. Hence, in distinction to the general skills factor, the specific skills dimension is characterized by reward-risk trade-offs. As expected from the asset specificity literature, including the Class as Employment Relations (CER) model, it is rather strongly tied to bilateral dependence. But – conspicuously – it is essentially unrelated both to class (in the EGP sense) and to policy preferences. The absence of correlations with class and preferences underscores that the specificity dimension is in fact unsuitable as a basis both for the CER and VoC models, despite theoretical (and sometimes empirical) claims to the contrary by the models' proponents.

Third, VoC assumes that specific skills increase labor market risk, especially high specific skills in combination with low general skills. This is true to some extent: Specific skills increase wage risk (in line with VoC) but in fact reduces unemployment risk. Skill specificity also increases wage reward (level), relative to unskilled workers, which is implicitly in line with VoC, since the difference in current wages between workers with specific skills and those with no skills is the basis of the skill specificity wage risk (the specific skill wage premium is tied to the current firm, which the general skill wage premium is not). The primary unexpected finding from the VoC

viewpoint is that unemployment risk is relatively low among specifically skilled workers. This might explain why there is no correlation between skill specificity and policy preferences: there is a trade-off between reward and risk in this group, consistent with the Becker model, and policy preferences seem to be affected primarily when high rewards and low risks go together (as in the power-resources approach, PRA). For the Class as Employment Relations (CER) perspective, there is a converse (relative to VoC) anomaly: the high employment security tied to asset specificity is expected, but the high wage risk is unexpected. So the trade-off involved in specific assets undermines both the policy preference argument in VoC and the service class argument in CER. But, to repeat, the trade-off is quite as expected by the training model of Becker. Also, the connection between asset specificity and reciprocal dependence supports the transaction cost model of Williamson, which in turn is a basic building block in both VoC and CER. A reasonable question, then, is why CER and VoC choose a *bilateral* (symmetrical) dependence situation as the basis for a theory of inequality, when it should be apparent that *reinforcing* rather than compensating mechanisms are more promising in this regard (cf. the power-resources approach, PRA).

In sum, the upshot of the analyses above is that the general skills dimension reinforces reward and risk, and therefore drives class distinctions as well as policy preferences, while the specific skills dimension trades off (compensates) reward and risk, and is therefore orthogonal to class distinctions and policy preferences. Theoretical accounts would benefit by taking these findings into consideration. Asset specificity should be removed from its central place in political economy models, and be replaced by skills in general.

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Table 1. Preference for income equality, by general and specific skills. OLS regression. Swedish LNU survey, 2000.

	Model 1		Model 2		Model 3	
	B	t	B	t	B	t
Relative skill specificity	0,09	2,3	0,21	3,3		
General skills			-0,08	-6,8		
Specific skills			-0,18	-5,5		
Mid general skills (2-5 yrs)					-0,30	-4,2
High general skills (6+ yrs)					-0,43	-4,2
Specific skills * Low general skills					-0,03	-0,7
Specific skills * Mid general skills					-0,11	-4,1
Specific skills * High general skills					-0,18	-3,9
Constant	3,32		3,74		3,72	
R^2	0,001		0,055		0,047	
N	2912		2912		2912	

Note: Specific skills = small occupation. General skills = average of years of education and years of required education. Relative skill specificity = specific skills divided by general skills.

Table 2. Descriptive statistics of all variables used. Swedish LNU survey, 2000.

	N	Min	Max	Mean	SD
Experience	3055	0	53	19,59	12,38
Seniority	3056	0	49	10,23	10,22
Educational requirements > Education	3026	0	10	0,59	1,22
General education, matched	3047	0	11	0,40	1,27
Occupation-specific education, matched	3039	0	12	2,05	2,50
Total education, matched	3026	0	12	2,46	2,50
Education > educational requirements	3026	0	12	1,32	1,80
General on-the-job training (OJT)	3037	0	3	0,78	0,97
Firm-specific on-the-job training (OJT)	3033	0	3	0,34	0,61
Small occupation	3049	0,20	14,45	1,15	1,09
Industry-specific occupation	3049	0,1	9,8	5,04	2,98
Relative skill specificity	3015	0,03	14,45	0,42	0,59
General skills	3026	0	12	3,42	2,44
Low general skills (0-1 yrs)	3026	0	1	0,29	0,45
Mid general skills (2-5 yrs)	3026	0	1	0,52	0,50
High general skills (6+ yrs)	3026	0	1	0,19	0,39
Ln wage/hour	2949	3,55	7,46	4,70	0,31
Reward, wage	2977	4,31	5,83	4,70	0,20
Risk, wage	2977	-1,58	0,33	-0,01	0,12
Risk, unemployment	2977	-5,47	1,62	-1,18	1,28
Class	3060	-1,10	1,77	0,00	1,00
Bilateral dependence	3031	1	9	5,62	1,46
Preference for income equality	2955	1	5	3,35	1,22

Note: For variable definitions, see section Data and variables.

Table 3. Wage level (ln wage/hour), by general and specific skills. OLS regression. Swedish LNU survey, 2000.

	B	t
Experience	0,012	9,0
Experience sq.	-0,019	-6,2
Seniority	0,000	0,5
Educational requirements > Education	0,023	5,5
General education, matched	0,049	11,6
Occupation-specific education, matched	0,043	14,6
Education > Educational requirements	0,013	4,6
General on-the-job training (OJT)	0,080	15,6
Firm-specific on-the-job training (OJT)	0,008	1,0
Small occupation * Low education	0,046	6,1
Small occupation * Mid education	0,037	7,4
Small occupation * High education	0,069	8,2
Industry-specific occupation	-0,027	-3,8
Industry-specific occupation sq.	0,014	2,0
Constant	4,389	
R^2	0,394	
N	2872	

Note: All variables except small occupation and industry-specific occupation measured in years. For variable definitions, see section Data and variables.

Table 4. Risk of wage loss and unemployment, by general and specific skills. OLS (model 1) and logistic (model 2) regressions. Swedish LNU surveys, 1991 and 2000.

	Wage loss		Unemployment	
	B	t	B	t
Experience	0,002	3,0	-0,099	-4,7
Experience sq.	0,006	4,1	0,171	2,9
Seniority	-0,003	-11,5	-0,086	-8,4
Educational requirements > Education	-0,002	-1,1	-0,077	-1,3
General education, matched	-0,023	-9,7	-0,272	-3,1
Occupation-specific education, matched	-0,012	-11,2	-0,281	-6,0
Education > Educational requirements	-0,009	-7,7	-0,076	-1,9
General on-the-job training (OJT)	0,012	7,1	-0,090	-1,4
Firm-specific on-the-job training (OJT)	0,034	12,2	0,133	1,3
Small occupation * Low education	-0,022	-8,5	-0,305	-2,9
Small occupation * Mid education	-0,059	-23,1	-0,112	-1,1
Small occupation * High education	-0,110	-24,7	0,123	0,7
Industry-specific occupation	0,007	13,9	-0,031	-1,7
Constant	0,007		1,845	
P = 1	0,200		0,323	
R^2	0,079		0,256	
N	1788		1845	

Note: Wage loss is wage change between 1991 and 2000 <= 20th percentile of wage change distribution. Unemployment is registered unemployment days > 0 between 1991 and 2000. P = 1 is the proportion with value 1 on each outcome.

Table 5. Preference for income equality, by labor market rewards and risks. OLS regression. Swedish LNU survey, 2000.

	B	t
Reward, wage	-1,202	-9,1
Risk, wage	0,837	4,0
Constant	9,017	
R^2	0,062	
N	2879	

Note: Reward (wage) and Risk (wage) are the predicted values of the regression equations in Table 3 and Table 4 (model 1), respectively.

Table 6. Preference for income equality, by general and specific skills. OLS regression. Swedish LNU survey, 2000.

	B	t
Experience	-0,002	-0,3
Experience sq.	0,012	0,8
Seniority	-0,005	-1,9
Educational requirements > Education	-0,071	-3,4
General education, matched	-0,064	-3,1
Occupation-specific education, matched	-0,072	-5,1
Education > Educational requirements	-0,049	-3,4
General on-the-job training (OJT)	-0,131	-5,3
Firm-specific on-the-job training (OJT)	-0,017	-0,4
Small occupation * Low education	-0,004	-0,1
Small occupation * Mid education	-0,110	-4,4
Small occupation * High education	-0,094	-2,3
Industry-specific occupation	-0,002	-0,1
Industry-specific occupation sq.	0,025	0,7
Constant	3,787	
R^2	0,068	
N	2879	

Table 7. Skills, rewards, risks and preferences. Factor analysis (loadings on varimax rotated principal components). Swedish LNU survey, 2000. N = 2859.

	factor 1	factor 2
Experience	-0,14	0,20
Seniority	0,05	0,76
Educational requirements > Education	-0,03	0,60
Education & Educational requirements, matched	0,80	0,01
Education > Educational requirements	-0,05	-0,59
General on-the-job training (OJT)	0,54	0,23
Firm-specific on-the-job training (OJT)	-0,03	0,35
Small occupation	0,55	-0,07
Industry-specific occupation	-0,19	0,07
Reward, wage	0,89	0,31
Risk, wage	-0,80	0,42
Risk, unemployment	-0,45	-0,74
Class	0,80	0,12
Bilateral dependence	0,00	0,40
Preference for income equality	-0,35	0,00
Eigenvalue	3,87	2,36
R^2	0,26	0,16
Cumulative R^2		0,42

Note: For variable definitions, see section Data and variables.

Table 8. Rewards, risks and preferences by general and specific skills and their interactions. OLS regressions. Swedish LNU surveys, 1991 and 2000.

	Reward, wage		Risk, wage		Risk, unemp		Pref for equality	
	B	t	B	t	B	t	B	t
Constant	4,699		-0,015		-1,184		3,357	
General skills	0,174	112,2	-0,073	-46,2	-0,474	-25,8	-0,293	-13,0
Specific skills	0,038	24,1	0,053	33,1	-0,679	-36,5	-0,027	-1,2
General * Spec skills	0,002	1,3	0,015	8,2	0,023	1,1	-0,082	-3,2
R^2	0,530		0,541		0,422		0,055	
Low Gen Low Spec (c)	4,469		0,000		0,396		3,580	
Low Gen Mid Spec	0,054	5,6	0,066	8,4	-1,091	-12,8	0,137	1,3
Low Gen High Spec	0,113	10,6	0,115	13,0	-2,299	-24,2	0,119	1,0
Mid Gen Low Spec	0,172	18,4	-0,062	-8,0	-0,770	-9,3	-0,374	-3,8
Mid Gen Mid Spec	0,173	21,9	0,005	0,8	-1,402	-20,1	-0,057	-0,7
Mid Gen High Spec	0,268	30,7	0,054	7,5	-2,454	-31,6	-0,258	-2,8
High Gen Low Spec	0,472	41,6	-0,244	-26,0	-1,528	-15,2	-0,526	-4,4
High Gen Mid Spec	0,467	54,3	-0,107	-15,0	-2,188	-28,6	-0,640	-7,0
High Gen High Spec	0,504	43,6	-0,037	-3,9	-3,037	-29,6	-0,665	-5,4
R^2	0,661		0,430		0,383		0,047	
N	2977		2977		2977		2879	

Note: General skills and Specific skills are factor scores based on the first and second factor, respectively, in Table 7 (first nine variables). Upper panel = continuous skill variables; lower panel = categorical skill variables (low <= percentile 25, high >= percentile 75).