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In a recent article in the *American Economic Review*, Jonathan R. Kesselman, Samuel H. Williamson and Ernst R. Berndt presented a Table showing the effect of substituting a marginal employment tax credit (METC) for the investment tax credit (ITC) over the 1962 to 1971 period. Their METC was defined in terms of a rate times the increase in the wage bill over the following base:

$$(1) Z_t = \mu (P_{B,t-1}B_{t-1} + P_{W,t-1}W_{t-1}) \quad \mu > 0$$

where B is blue collar employment, W is white collar employment, and P_B and P_W are the wage rates for blue collar and white collar workers respectively.

Any base, including a wage bill base, is of course merely a proxy for what employment might be in the absence of a credit. However, needless to say, some bases are better than others. In this comment, I will argue that (1) is an inappropriate way to define a base for a permanent METC that is directed at encouraging the long-run substitution of labour for capital. A better definition for a wage bill base would be:

$$(2) Z_t = \mu(1+g)^t (P_{B,0}B_0 - + P_{w,0} W_0) \quad \mu > 0$$

where g is the assumed growth rate of the wage bill without the credit, and the 0 subscript refers to the period before the implementation of the credit.¹ After completing my argument concerning this point, I will go on to make a few observations on the relevance of this analysis for the 1977 U.S. Job Credit which has a base as defined in (1), but which is an explicitly temporary measure and will only be in effect in 1977 and 1978.

I The Appropriate Base for a Permanent METC

It is easiest to show that (1) is inappropriate if three simplifying assumptions are made. First, μ is set equal to 1 in both (1) and (2) which means for (1) that the total wage bill in the previous year is used as a base, or for (2) that the total wage bill in the year before the METC is implemented is used as the base. Second, it is assumed that there will be no growth in employment except that stimulated by the credit, thus g in (2) can be set equal to 0. Third, it is assumed that with or without the credit wage rates will remain constant.

Having made these three assumptions (1) can be written:

$$(3) Z_t = P_{B,t-1} B_{t-1} - + P_{W,t-1} W_{t-1}$$

and (2) can be written:

$$(4) Z_t = P_B B_0 + P_w W_0.$$

Suppose that in the first year of the METC the employer is induced to increase his employment to B_1 and W_1 . Then under both base definitions (3) and (4) he would qualify for a credit of

$$(5) C_1 = C'_1 = c(P_B (B_1 - B_0) + P_w (W_1 - W_0))$$

where C_1 and C'_1 are the total value of the credit under base definitions (3) and (4) respectively, and c is the rate of the credit. However, in the second year the credits would differ under the two base definitions. Under (3) the employer would receive:

$$(6) C_2 = c(P_B (B_2 - B_1) + P_w (W_2 - W_1))$$

and under (4) the employer would get

$$(7) C'_2 = c(P_B (B_2 - B_0) + P_w (W_2 - W_0))$$

The second assumption made above implies that (B_2-B_1) and (W_2-W_1) are both equal to zero. Thus, C_2 is also equal to zero. In contrast (B_2-B_0) and (W_2-W_0) are equal to (B_2-B_1) and (W_2-W_1) respectively, so C'_2 is equal to C'_1 . In the third and all subsequent periods the same result is obtained, i.e. C_n is equal to zero and C'_n is equal to C'_1 .

The implication of this is very clear. It would not be rational for an employer to increase-employment-in order to benefit from a permanently lower relative cost of labour if the METC was defined using the base formula (3) which corresponds to the formula (1) utilized by Kesselman *et al.* in their article. If an employer were to substitute labour for capital in the first year in order to benefit from the credit, he would only have to reverse the substitution in the second year when the lower relative price of labour, which justified the use of more labour intensive techniques, reverted back to its level before the METC. No rational employer would respond to such an incentive because of the costs associated with changing the capital labour mix. On the other hand, if the METC were defined using formula (4), which corresponds to formula (2) above, it would be rational for an employer to substitute labour for capital because the credit would permanently lower the relative cost of labour, and he would be able to permanently raise his labour-capital ratio.

The argument that a METC with a base as defined in (1) will not induce the long-run substitution of labour for capital, only holds if μ is greater than or equal to 1. As μ approaches 0, the METC with a base defined as in (1) becomes closer and closer to a non-marginal employment tax credit with the credit paid on total employment. To the extent that μ is between 1 and 0, the METC would stimulate some long-run substitution of labour for capital. The feature of (1) that makes it an inappropriate way to define the base is that the base moves up with induced employment, and reduces the value of the incentive in subsequent periods. For instance, if μ is set equal to 1/2 and the other two assumptions concerning no employment growth without the credit and constant wage rates are made, the credit would only be paid on 1/2 of induced employment after the first period. In general, the credit would be paid on $1-\mu$ of the induced employment. This reduces the amount of long-run substitution of labour for capital relative to what it would be with a METC having a base as defined in (2).

The second and third simplifying assumptions made above can also be relaxed without effecting the validity of the conclusion that a METC with a base as defined in (2) is better than one with a base as defined in (1).

It is important to note that the choice of μ and g in

formula (2) determines who can benefit from the credit. The higher that μ and g are the fewer are the number of employers who would be in a position to take advantage of the METC. The employers who would be induced to hire additional workers would be those who expected their wage bill to be above the base. Those who expected their wage bill to be below the base would have no incentive to take on additional workers.

As the value chosen for μ approaches and surpasses 1, there is an important distinction that must be kept in mind in order to accurately assess the costs of any METC scheme. The distinction is that in the aggregate the METC is paid on the gross difference between the wage bill and the base, not the net. The aggregate gross difference is the sum of the differences between the wage bill and the base for all employers with wage bills greater than the base; whereas the aggregate net difference is the sum of the differences for all employers, including those whose wage bills have fallen below the base. With μ equal to a maximum of .9 as in the Kesselman *et al.* article this distinction is not so important because relatively few employers have their wage bills shrink by more than 10 per cent in any given year.

II The Job Credit

The Tax Reduction and Simplification Act, which became Public Law 95-30 following approval by the President on May 23, 1977, contains a new Job Credit. The credit was initiated by the Congress as a replacement for the Administration proposal giving businesses a choice between either a 2 percentage point increase in the present 10 per cent investment credit, or a refundable credit against income taxes equal to 4 per cent of social security payroll taxes and 2 per cent of railroad retirement and self-employment taxes.

For a taxable year beginning in 1977, the credit is equal to 50 per cent of the excess of the aggregate unemployment insurance wages paid during 1977 over 102 per cent of the aggregate unemployment insurance wages paid during 1976. For a taxable year beginning in 1978, the credit is equal to 50 per cent of the excess of the aggregate unemployment insurance wages paid during 1978 over 102 per cent of the aggregate unemployment insurance wages during 1977. Since the unemployment insurance wage per worker is \$4,200, the 50 per cent credit is worth \$2.100 per job. The Job Credit is, thus, defined as in (1) with μ equal to 1.02 and P_b and P_w equal to \$4,200.

Before moving on to consider how the Job Credit might work, it is worth noting that there are some restrictions on the credit which reduce its coverage. First, 102 per cent of the amount of the aggregate unemployment insurance wages paid during the preceding calendar year shall be deemed to be not less than 50 per cent of the amount of current wages. This restriction reduces the value of the credit to new or rapidly expanding employers. Second, the amount of the credit shall not exceed 50 per cent of the difference between the aggregate wages paid in a given year and 105 per cent of the preceding year's wages. This restriction lessens the incentive to substitute lower paid part-time for full-time labour. Third, the credit with respect to any calendar year shall not exceed \$100,000, except in the case of the additional 10 per cent credit for vocational rehabilitation referrals. This last restriction is the most severe. It caps the eligible increased employment at 47 per employer. In effect, it transforms the Job Credit from a general incentive to one directed at small to medium sized business. For large business, the credit is infra-marginal and should not effect decision making at the margin.

Since the Job Credit is temporary and marginal with a base as defined by formula (1), it will probably not lead to more output through lower prices or to much long-run substitution of labour for capital. By long-run substitution, I mean the type of

substitution that occurs when a business purchases new capital equipment that can be used in combination with more labour than can the existing capital equipment. However, the credit could perhaps stimulate some short-run substitution of labour for capital and other factors of production. With the credit it may pay to use existing capital equipment more intensively, rather than to add new equipment. Old machines may be made to last longer by servicing them more frequently. It may also be possible to economize on the use of energy and materials in the short-run by using more labour. Finally, the credit could perhaps cause the postponement of the adoption of more capital intensive techniques.

An important effect of the Job Credit that has tended to be overlooked is that, since it is temporary, it would encourage the intertemporal substitution of labour. Employment could be brought forward in time to take advantage of the credit. Since many employers have excess productive capacity, they do not need to invest to acquire the capital stock necessary to use additional workers productively. All they need is the incentive. The credit would provide that incentive. It would encourage them to employ more workers to produce for inventory while production costs are lower due to the credit. When demand picks up the existence of larger stocks will serve the useful purpose of preventing shortages from developing and keeping prices from

rising as much as they ordinarily would. Furthermore, the credit could be expected to stimulate construction. The price tag of construction projects is usually the result of bilateral negotiations or competitive tendering. Many contractors can be expected to attempt to drum up business by sharing the credit with their customers. In addition, employers might be induced to bring forward some large maintenance projects that need only be performed every few years, or they might enlarge their training programs while they can get the government to pick up part of the tab.

It is through the short-run substitution of labour for capital, the postponement of the adoption of more capital intensive techniques, and the intertemporal substitution of labour that the Job Credit will increase employment. Although the effect of the credit on employment is impossible to quantify before the fact, it could turn out to be quite large. It must be emphasized, however, that it is not through the traditional neoclassical mechanism of long-run substitution of labour for capital that the Job Credit will increase employment. Unfortunately, the neoclassical model, as it now stands, tells us very little about what to expect from temporary fiscal policy measures, such as the Job Credit, designed to operate on factor price ratios.

ENDNOTES

* Canadian Department of Finance. The views expressed herein are my own, and no responsibility for them should be attributed to the Department of Finance. I am indebted to John Sargent, Chris Georgas, and John Lester with whom I have discussed the subject matter of this comment.

1. If it is desired to extend the credit only for increases in employment and not for increases in wage rates, then $P_{B,0}$ and $P_{W,0}$ in (2) should be replaced by $P_{B,t}$ and $P_{W,t}$. I have not done this here because I want to use a credit with a wage bill base like Kesselman *et al.* for purposes of comparison.

REFERENCE

J.R. Kesselman, S.H. Williamson, and E.R. Berndt, "Tax Credits for Employment Rather than Investment," *American Economic Review*, June 1977, 67, 339-349.