Identity Politics and Trade Policy
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Appendix

Properties of Wage Functions

The wage functions \( w_h(p) \) and \( w_\ell(p) \) are solved from the pricing equations

\[
\begin{align*}
p &= c_Z(w_h, w_\ell), \\
1 &= c_X(w_h, w_\ell),
\end{align*}
\]

where \( c_j(w_h, w_\ell) \) is the unit cost in sector \( j \). Logarithmic differentiation of these pricing equations yields (see Jones, 1965):

\[
\begin{align*}
\frac{w'_h(p)}{w_h(p)} p &= -\frac{1 - \theta_{hX}(p)}{\theta_{hX}(p) - \theta_{hZ}(p)} < 0, \\
\frac{w'_\ell(p)}{w_\ell(p)} p &= -\frac{\theta_{hX}(p)}{\theta_{hX}(p) - \theta_{hZ}(p)} > 1,
\end{align*}
\]

where \( \theta_{ij}(p) \) is the share of input \( i \) in the cost of sector \( j \) and \( \theta_{hX}(p) > \theta_{hZ}(p) \) when the export sector is intensive in more-skilled workers. In the Cobb-Douglas case, these cost shares are constant. In the Leontief case \( \theta_{ij}(p) = w_i(p) a_{ij} \sum_k a_{k,j} w_k(p) \), where \( a_{ij} \) are constant input-output coefficients; that is, \( a_{ij} \) is the input of workers of type \( i, i = h, \ell \), needed to produce one unit of good \( j, j = Z, X \). In the Leontief case, \( w_i(p) \) is a linear function of \( p \) for \( i = h, \ell \), and therefore \( w''_i(p) = 0 \) for \( i = h, \ell \). In the Cobb-Douglas case, these equations imply

\[
\begin{align*}
0 &= \frac{w''_h(p) p}{w'_h(p)} - \frac{w'_h(p) p}{w_h(p)} + 1 = \frac{w''_h(p) p}{w'_h(p)} + \frac{1 - \theta_{hM}}{\theta_{hX} - \theta_{hM}}, \\
0 &= \frac{w''_\ell(p) p}{w'_\ell(p)} - \frac{w'_\ell(p) p}{w_\ell(p)} + 1 = \frac{w''_\ell(p) p}{w'_\ell(p)} - \frac{\theta_{hX} - \theta_{hM}}{\theta_{hX} - \theta_{hM}}.
\end{align*}
\]

Evidently, in this case, \( w''_i(p) > 0 \) for \( i = h, \ell \), because our factor intensity assumption implies \( w'_h(p) < 0 \) and \( w'_\ell(p) > 0 \).

Note, however, that the sign of \( w''_h(p) \) can differ from the sign of \( w''_\ell(p) \). To illustrate, suppose that in sector \( j \) the technology is Leontief while in the other sector it is Cobb-Douglas. Then twice differentiating the pricing equation for sector \( j \) yields \( \sum_{i=h,\ell} w''_i(p) a_{ij} = 0 \). Since in this case the wage functions are not linear in \( p \), this equation implies that \( w''_h(p) \) has the opposite sign from \( w''_\ell(p) \).
Section 4.2

Let $\pi_i$ be the productivity of labor of type $i$, $i = h, \ell$, the same in the exportable and import-competing sectors. If, say, $\pi_h$ rises from its initial value of one to $\pi_h = 2$, this means that with the new technology a firm can use half the amount of more-skilled labor to produce the same output as it did with the old technology. Now, the wage rates can be written as the solution to

$$
p = c_Z \left( \frac{w_h}{\pi_h}, \frac{w_\ell}{\pi_\ell} \right),
$$

$$
1 = c_X \left( \frac{w_h}{\pi_h}, \frac{w_\ell}{\pi_\ell} \right).
$$

Let these solutions be $\tilde{w}_h (p; \pi_h)$ and $\tilde{w}_\ell (p; \pi_\ell)$. Then, using the functions $w_h (p)$ and $w_\ell (p)$ from the previous section of the Appendix, which describe the solution of this system when $\pi_h = \pi_\ell = 1$, we obtain

$$
\tilde{w}_i (p; \pi_i) = \pi_i w_i (p) \quad \text{for } i = h, \ell.
$$

(15)

In other words, an increase in $\pi_i$ raises proportionately the wage rate of labor of type $i$, given the domestic price of imports. These equations imply

$$
Y (p; \pi_h, \pi_\ell) \equiv Y_X (p; \pi_h, \pi_\ell) + pY_Z (p; \pi_h, \pi_\ell) \equiv \sum_{i=h,\ell} \lambda_i \pi_i w_i (p).
$$

(16)

In this case, we can express the aggregate utility level in regime $r$ as (see (8))

$$
U^r (p, q; \pi_h, \pi_\ell) = \lambda_h A^h_h + \lambda_\ell A^\ell_\ell + \lambda_h \pi_{h}^{b,r} A^b_h + \lambda_\ell \pi_{\ell}^{b,r} A^b_\ell + \left( 1 + \alpha + \alpha^b \sum_{i=h,\ell} \lambda_i \pi_{i}^{b,r} \right) \left[ Y (p; \pi_h, \pi_\ell) + (p - q) \Omega (p; \pi_h, \pi_\ell) + \Gamma (p) \right] - \sum_{i=h,\ell} \pi_{i}^{b,r} \lambda_i (1 - \lambda_i)^2 [\delta (p; \pi)]^2,
$$

(17)

where $\Omega (p; \pi_h, \pi_\ell) = C (p) - Y_Z (p; \pi_h, \pi_\ell)$. The first-order condition that characterizes the initial equilibrium value of $p$ in regime $r$, $p^r$, is given by

$$
U^r_p (p^r, q; \pi_h, \pi_\ell) \big|_{\pi_{h}=\pi_{\ell}=1} = 0.
$$

(18)

Now, starting with $\pi_h = \pi_\ell = 1$, consider changes in $\pi_i$ of the form

$$
d\pi_h = \rho d\pi,
$$

$$
d\pi_\ell = d\pi > 0.
$$

For $0 \leq \rho < 1$ this represents less-skilled labor biased technical change, for $\rho = 1$ it represents Hicks-neutral technical change, and for $\rho > 1$ it represents more-skilled labor biased technical
change.

We are interested in the impact of these forms of technical change on the equilibrium domestic price, and hence the tariff rate. Then

$$\text{sign} \frac{\partial p^r}{\partial \pi} = \text{sign} \left[ \frac{\partial}{\partial \pi^r} U_p^r (p^r, q; \pi_h, \pi_\ell) + \rho \frac{\partial}{\partial \pi_h} U_p^r (p^r, q; \pi_h, \pi_\ell) \right]_{\pi_h = \pi_\ell = 1}$$

$$= \text{sign} \left[ \sum_{i = h, \ell} \frac{\partial}{\partial \pi_i} U_p^r (p^r, q; \pi_h, \pi_\ell) + (\rho - 1) \frac{\partial}{\partial \pi_h} U_p^r (p^r, q; \pi_h, \pi_\ell) \right]_{\pi_h = \pi_\ell = 1}$$

To evaluate the expression in the second line of (19), note that the first-order condition for the equilibrium policy together with (9) yields

$$U_p^r (p^r, q; \pi_h, \pi_\ell) \bigg|_{\pi_h = \pi_\ell = 1}$$

$$= \left( 1 + \alpha + \alpha^b \sum_{i = h, \ell} \pi_i^b \lambda_i \right) (p^r - q) \Omega' (p^r; \pi_h, \pi_\ell) \bigg|_{\pi_h = \pi_\ell = 1}$$

$$- 2 \left[ \sum_{i = h, \ell} \beta_i^h \pi_i \lambda_i (1 - \lambda_i)^2 \right] \delta (p^r; \pi_h, \pi_\ell) \bigg|_{\pi_h = \pi_\ell = 1} \delta' (p^r; \pi_h, \pi_\ell) \bigg|_{\pi_h = \pi_\ell = 1}$$

$$= 0.$$

Also note from (16) that

$$Y' (p; \pi_h, \pi_\ell) = Y_Z (p; \pi_h, \pi_\ell) = \sum_{i = h, \ell} \lambda_i \pi_i w_i^h (p).$$

Using $\Omega (p; \pi_h, \pi_\ell) = C_Z (p) - Y_Z (p; \pi_h, \pi_\ell)$ and (21), we obtain

$$\frac{\partial}{\partial \pi_i} U_p^r (p^r, q; \pi_h, \pi_\ell) \bigg|_{\pi_h = \pi_\ell = 1}$$

$$= - \left( 1 + \alpha + \alpha^b \sum_{i = h, \ell} \pi_i^b \lambda_i \right) (p^r - q) \frac{\partial}{\partial \pi_i} Y_Z' (p^r; \pi_h, \pi_\ell) \bigg|_{\pi_h = \pi_\ell = 1}$$

$$- 2 \left[ \sum_{i = h, \ell} \beta_i^h \pi_i \lambda_i (1 - \lambda_i)^2 \right] \delta (p^r; 1, 1) \frac{\partial}{\partial \pi_i} \delta' (p^r; \pi_h, \pi_\ell) \bigg|_{\pi_h = \pi_\ell = 1}$$

$$- 2 \left[ \sum_{i = h, \ell} \beta_i^h \pi_i \lambda_i (1 - \lambda_i)^2 \right] \frac{\partial}{\partial \pi_i} \delta (p^r; \pi_h, \pi_\ell) \bigg|_{\pi_h = \pi_\ell = 1} \delta' (p^r; 1, 1).$$

But

$$\delta (p; \pi_h, \pi_\ell) = \pi_h w_h (p) - \pi_\ell w_\ell (p),$$

$$\delta' (p; \pi_h, \pi_\ell) = \pi_h w_h' (p) - \pi_\ell w_\ell' (p).$$
which imply

\[
\frac{\partial}{\partial \pi_h} U^r_p (p^r, q; \pi_h, \pi_\ell) \bigg|_{\pi_h=\pi_\ell=1} = \\
- \left( 1 + \alpha + \alpha^b \sum_{i=h,\ell} \gamma_i^{b,r} \lambda_i \right) \left( p^r - q \right) \frac{\partial}{\partial \pi_h} Y^r_Z (p^r; \pi_h, \pi_\ell) \bigg|_{\pi_h=\pi_\ell=1} \\
- 2 \left[ \sum_{i=h,\ell} \beta_i^{h,r} \lambda_i (1 - \lambda_i)^2 \right] \left[ \delta (p^r) w^h (p^r) + w_\ell (p^r) \delta' (p^r) \right] ,
\]

\[
\frac{\partial}{\partial \pi_\ell} U^r_p (p^r, q; \pi_h, \pi_\ell) \bigg|_{\pi_h=\pi_\ell=1} = - \left( 1 + \alpha + \alpha^b \sum_{i=h,\ell} \gamma_i^{b,r} \lambda_i \right) \left( p^r - q \right) \frac{\partial}{\partial \pi_\ell} Y^r_Z (p^r; \pi_h, \pi_\ell) \bigg|_{\pi_h=\pi_\ell=1} \\
+ 2 \left[ \sum_{i=h,\ell} \beta_i^{h,r} \lambda_i (1 - \lambda_i)^2 \right] \left[ \delta (p^r) w^h (p^r) + w_\ell (p^r) \delta' (p^r) \right] .
\]

It follows that

\[
\sum_{i=h,\ell} \frac{\partial}{\partial \pi_i} U_p (p^r, q; \pi_h, \pi_\ell) \bigg|_{\pi_h=\pi_\ell=1} = - \left( 1 + \alpha + \alpha^b \sum_{i=h,\ell} \gamma_i^{b,r} \lambda_i \right) \left( p^r - q \right) \sum_{i=h,\ell} \frac{\partial}{\partial \pi_i} Y^r_Z (p^r; \pi_h, \pi_\ell) \bigg|_{\pi_h=\pi_\ell=1} \\
- 4 \left[ \sum_{i=h,\ell} \beta_i^{h,r} \lambda_i (1 - \lambda_i)^2 \right] \delta (p^r) \delta' (p^r) .
\]

But (21) implies

\[
\sum_{i=h,\ell} \frac{\partial}{\partial \pi_i} Y^r_Z (p^r; \pi_h, \pi_\ell) \bigg|_{\pi_h=\pi_\ell=1} = Y^r_Z (p^r; 1, 1) > 0.
\]

Using this result and the first-order condition (20) we obtain

\[
\sum_{i=h,\ell} \frac{\partial}{\partial \pi_i} U_p (p^r, q; \pi_h, \pi_\ell) \bigg|_{\pi_h=\pi_\ell=1} = - Y^r_Z (p^r; 1, 1) - 2 \Omega^r (p^r; 1, 1) \\
= - 2 \Omega^r (p^r) + Y^r_Z (p^r; 1, 1) > 0 .
\]

This proves that Hicks-neutral technical change (\( \rho = 1 \)) raises the rate of protection.

We turn now to (pure) skilled-biased technical change, which requires that we evaluate
\[
\frac{\partial}{\partial \pi_h} U_p^r (p^r, q; \pi_h, \pi_\ell) \bigg|_{\pi_h = \pi_\ell = 1}. \quad \text{Equations (20) and (21) imply}
\]
\[
\frac{\partial}{\partial \pi_h} U_p^r (p^r, q; \pi_h, \pi_\ell) \bigg|_{\pi_h = \pi_\ell = 1} = - \left( 1 + \alpha + \alpha^b \sum_{i=h,\ell} \beta_i^{h,r} \lambda_i \right) (p^r - q) w''_h (p^r) \lambda_h - 2 \left[ \sum_{i=h,\ell} \beta_i^{h,r} \lambda_i (1 - \lambda_i)^2 \right] \left[ \delta (p^r) w'_h (p^r) + w_h (p^r) \delta' (p^r) \right].
\]

Evidently, \( \frac{\partial}{\partial \pi_h} U_p^r (p^r, q; \pi_h, \pi_\ell) \bigg|_{\pi_h = \pi_\ell = 1} > 0 \) if \( w''_h (p^r) \leq 0 \), which is satisfied when both sectors produce with Leontief technologies. In this case, skill-augmenting technical change raises the rate of protection. We next consider the case when \( w''_h (p^r) > 0 \). Substituting the first-order condition (20) into the former equation yields
\[
\frac{\partial}{\partial \pi_h} U_p^r (p^r, q; \pi_h, \pi_\ell) \bigg|_{\pi_h = \pi_\ell = 1} = - \left( 1 + \alpha + \alpha^b \sum_{i=h,\ell} \beta_i^{h,r} \lambda_i \right) (p^r - q) \Omega' (p^r; 1, 1) - \frac{\lambda_h w''_h (p^r)}{Y_Z (p^r; 1, 1) - C_Z' (p^r)} + \frac{w'_h (p^r)}{\delta' (p^r)} + \frac{w_h (p^r)}{\delta (p^r)}.
\]

Now note that
\[
0 < \frac{w'_h (p^r)}{\delta (p^r)} < 1 \quad \text{and} \quad \frac{w_h (p^r)}{\delta (p^r)} > 1,
\]
so that the sum of the last two terms exceeds one. Moreover,
\[
\frac{\lambda_h w''_h (p^r)}{Y_Z (p^r; 1, 1) - C_Z' (p^r)} = \frac{\lambda_h w''_h (p^r)}{\sum_{i=h,\ell} \lambda_i w''_i (p^r) - C_Z' (p^r)}.
\]

When this expression is smaller than one, we have \( \frac{\partial}{\partial \pi_h} U_p^r (p^r, q; \pi_h, \pi_\ell) \bigg|_{\pi_h = \pi_\ell = 1} > 0 \), and skill-augmenting technical change raises the rate of protection. This condition is satisfied when \( w''_h (p^r) > 0 \) and \( w''_h (p^r) > 0 \), which happens when the production functions in both sectors are Cobb-Douglas in form. Note, however, that even if this condition fails, the tariff rate may still increase in response to skill-biased technical change, because \( \frac{w'_h (p^r)}{\delta (p^r)} + \frac{w_h (p^r)}{\delta (p^r)} > 1 \).

Section 4.3

For an interior equilibrium in regime \( r \), (9) implies that \( p^r \) satisfies
\[
U_p^r (p^r, q) = \left( 1 + \alpha + \alpha^b \sum_{i=h,\ell} \beta_i^{h,r} \lambda_i \right) (p^r - q) \Omega' (p^r)
\]
\[
- 2 \left[ \sum_{i=h,\ell} \beta_i^{h,r} \lambda_i (1 - \lambda_i)^2 \right] \delta (p^r) \delta' (p^r) = 0.
\]
We assume that either $b^h_r = 1$ or $b^l_r = 1$ in this equilibrium (that is, some individuals identify with the broad nation). Under these circumstances, the first-order condition implies $p^r > q$; that is, $t^r > 0$. We are interested in the response of $t^r$ to an improvement in the terms of trade, i.e., to $dq < 0$.

We can write the first-order condition for the optimal tariff as

$$ U_p^r [(1 + t^r) q, q] = 0, \quad (25) $$

where $U_p^r [(1 + t^r) q, q]$ is the derivative of $U^r [(1 + t^r) q, q]$ with respect to the first argument (i.e., with respect to $p$), evaluated at $t = t^r$. The second-order condition requires $U_{pp}^r [(1 + t^r) q, q] q < 0$.

In this case

$$ \frac{\partial t^r}{\partial q} \times \frac{q}{1 + t^r} = -\frac{1}{U_{pp}^r [(1 + t^r) q, q]} \left\{ \frac{U_p^r [(1 + t^r) q, q]}{1 + t^r} \right\}, $$

where $U_{pq}^r [(1 + t^r) q, q]$ is the derivative of $U_p^r [(1 + t^r) q, q]$ with respect to the second argument. Note, however, from (9) that

$$ U_{pq}^r [(1 + t^r) q, q] = -\left( 1 + \alpha + \alpha^b \sum_{i=h,\ell} b^h_r (1 - \lambda_i) \right) \Omega' [(1 + t^r) q], $$

which implies

$$ \frac{\partial t^r}{\partial q} \times \frac{q}{1 + t^r} = -1 + \frac{1 + \alpha + \alpha^b \sum_{i=h,\ell} b^h_r (1 - \lambda_i)}{p^r U_{pp}^r (p^r, q)} q \Omega'(p^r). \quad (26) $$

Since $U_{pq}^r [(1 + t^r) q, q] > 0$, the domestic price $p^r$ is increasing in $q$. That is, an improvement in the terms of trade leads to a lower domestic price. But we are also interested in whether the tariff rate rises in response to an improvement in the terms of trade, which it does if and only if the expression in (26) is negative.

Since $\Omega'(p^r) < 0$ and $U_{pp}^r (p^r, q) < 0$, the expression in (26) is negative if and only if

$$ 1 + \alpha + \alpha^b \sum_{i=h,\ell} b^h_r (1 - \lambda_i) < \frac{p^r U_{pp}^r (p^r, q)}{q \Omega'(p^r)} . $$

Using (9) to compute $U_{pp}^r (\cdot)$, this is equivalent to

$$ -q \Omega'(p^r) < -p^r \left[ \Omega'(p^r) + (p^r - q) \Omega''(p^r) \right] + 2p^r \sum_{i=h,\ell} b^h_r (1 - \lambda_i)^2 \frac{\delta (p^r) \delta''(p^r) + [\delta'(p^r)]^2}{1 + \alpha + \alpha^b \sum_{i=h,\ell} b^h_r (1 - \lambda_i) \lambda_i} \left\{ \delta (p^r) \delta''(p^r) + [\delta'(p^r)]^2 \right\}. $$

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But the first-order condition (24) implies

\[ 2 \sum_{i=h,t} \beta_i \frac{\beta_i}{I_i} (1 - \lambda_i) (p^r - q) \Omega' (p^r) + \frac{\delta (p^r)}{\delta (p^r)} = \frac{(p^r - q) \Omega' (p^r)}{\delta (p^r)} \cdot \]

Substituting this result into the previous inequality yields

\[ (p^r - q) \Omega' (p^r) < -p^r (p^r - q) \Omega'' (p^r) + (p^r - q) \Omega' (p^r) \left[ \frac{\delta'' (p^r)}{\delta' (p^r)} + \frac{\delta' (p^r)}{\delta (p^r)} \right]. \]

Dividing by \((p^r - q) \Omega' (p^r) < 0\) yields

\[ \frac{-p^r \Omega'' (p^r)}{\Omega' (p^r)} + \frac{\delta' (p^r) p^r}{\delta (p^r)} + \frac{\delta'' (p^r) p^r}{\delta (p^r)} < 1. \]

The second term on the left-hand side of the inequality is negative, and the third term is negative when \(\delta'' (p^r) \geq 0\) (the latter holds, for example, when the production functions are Leontief in both sectors, because in this case the wage functions are linear in \(p\)). In these circumstances, \(\Omega'' (p^r) \leq 0\) is a sufficient condition for this inequality to be satisfied. But of course, this inequality can also be satisfied in many other cases.\(^{31}\)

**Section 5**

We first discuss how technical change and changes in the terms of trade can bring about a populist revolution. Begin with technical change. Note that, when computing the impact of \(\pi_i\) on \(U^r (\cdot)\), we can ignore the welfare effects of the induced change in \(p^r\) thanks to the Envelope Theorem. For Hicks-neutral technical change we obtain

\[ \frac{\partial U^r (p^r, q; \pi, \pi)}{\partial \pi} \bigg|_{\pi=1} = \left( 1 + \alpha + \alpha^b \sum_{i=h,t} \lambda_i b_i \right) Y_X (p^r, q) + q Y_Z (p^r) - 2 \sum_{i=h,t} \beta_i \lambda_i (1 - \lambda_i)^2 \delta (p^r)^2. \]

When all individuals identify with the nation, i.e., \(r = (1,1)\), this yields

\[ \frac{\partial U^{(1,1)} (p_{h,t}, q; \pi, \pi)}{\partial \pi} \bigg|_{\pi=1} = \left( 1 + \alpha + \alpha^b \right) [Y_X (p_{h,t}) + q Y_Z (p_{h,t})] - 2 \sum_{i=h,t} \beta_i \lambda_i (1 - \lambda_i)^2 \delta (p_{h,t})^2, \]

\(^{31}\)Note that in the Leontief case \(\delta'' (p^r) = 0\) and \(\Omega' (p^r) = C_Z' (p^r)\), because \(Y_Z\) does not vary with \(p\). Under these circumstances

\[ \frac{p^r \Omega'' (p^r)}{\Omega' (p^r)} = -p^r \frac{C_Z'' (p^r)}{C_Z' (p^r)}, \]

which is the elasticity of the slope of the demand function. If the demand function is concave, then \(C_Z'' (p^r) < 0\) and this expression is negative.
and when only the more-skilled workers identify with the nation, i.e., \( r = (1, 0) \), we obtain
\[
\left. \frac{\partial U^{(1,0)} (p, q; \pi, \pi)}{\partial \pi} \right|_{\pi=1} = \left( 1 + \alpha + \alpha^b \lambda_h \right) \left[ Y_X (p_h) + q Y_Z (p_h) \right] - 2 \beta^b_h \lambda_h (1 - \lambda_h)^2 \delta (p_h)^2 .
\]

Evidently, technical change raises aggregate income, which contributes to welfare, but it increases the cognitive dissonance arising due to differences in material well-being. The change in national income is given by
\[
\left[ Y_X (p) + q Y_Z (p) \right]' = Y_X' (p) + q Y_Z' (p) = -(p - q) Y_Z' (p) ,
\]
because \( Y_X' (p) + p Y_Z' (p) = 0 \). Therefore \( [Y_X (p) + q Y_Z (p)]' \) is decreasing in \( p \) for \( p > q \). It follows that, for the case of \( p_h > p_{h, \ell} \)
\[
Y_X (p_h) + q Y_Z (p_h) < Y_X (p_{h, \ell}) + q Y_Z (p_{h, \ell}) ,
\]
and since \( \delta (p) \) is declining in \( p \),
\[
\delta (p_h) < \delta (p_{h, \ell}) .
\]
In these circumstances,
\[
\left( 1 + \alpha + \alpha^b \lambda_h \right) \left[ Y_X (p_h) + q Y_Z (p_h) \right] - 2 \sum_{i=h, \ell} \beta^b_i \lambda_i (1 - \lambda_i)^2 \delta (p_{h, \ell})^2
\]
can be larger or smaller than
\[
\left( 1 + \alpha + \alpha^b \lambda_h \right) \left[ Y_X (p_h) + q Y_Z (p_h) \right] - 2 \beta^b_h \lambda_h (1 - \lambda_h)^2 \delta (p_h)^2 .
\]
In situations in which it is smaller and \( U^{(1,1)} (p_{h, \ell}, q; 1, 1) \simeq U^{(1,0)} (p_h, q; 1, 1) \), Hicks-neutral technical change will reduce the advantage of the \( r = (1, 1) \) regime and thereby generate a populist revolution. In other words, a necessary and sufficient condition for Hicks-neutral technical change to lead to a populist revolutions is for \( U^{(1,1)} (p_{h, \ell}, q; 1, 1) \) to be slightly greater than \( U^{(1,0)} (p_h, q; 1, 1) \) and for the following inequality to be satisfied:
\[
\left( 1 + \alpha + \alpha^b \lambda_h \right) \left[ Y_X (p_h) + q Y_Z (p_h) \right] - 2 \sum_{i=h, \ell} \beta^b_i \lambda_i (1 - \lambda_i)^2 \delta (p_{h, \ell})^2
\]< \left( 1 + \alpha + \alpha^b \lambda_h \right) \left[ Y_X (p_h) + q Y_Z (p_h) \right] - 2 \beta^b_h \lambda_h (1 - \lambda_h)^2 \delta (p_h)^2 .
\]
In general, we do not know whether aggregate (material-cum- psychosocial) welfare rises or falls with \( \pi \).

Next consider the case of skill-augmenting technical change. In this case,
\[
\delta (p; \pi, 1) = \pi w_h (p) - w_\ell (p) .
\]
Also, $Y_h(p; \pi, 1)$ is increasing in $\pi$ and $Y_Z(p; \pi, 1)$ is declining in $\pi$, due to the Rybczynski effect (an increase in $\pi$ acts like an increase in the endowment of more-skilled workers). Moreover, we have

$$Y(p; \pi, 1) = \lambda_h \pi w_h(p) + \lambda_\ell w_\ell(p),$$
$$Y'(p; \pi, 1) = Y_Z(p; \pi, 1) = \lambda_h \pi w'_h(p) + \lambda_\ell w'_\ell(p),$$
$$Y_{Z,\pi}(p; \pi, 1) = \lambda_h w'_h(p).$$

Then, (17) implies

$$\frac{\partial U^r(p^r, q; \pi, 1)}{\partial \pi} \bigg|_{\pi=1} = \lambda_h \left( 1 + \alpha + \alpha^b \sum_{i=h, \ell} \lambda_i \pi_i^{b,r} \right) \left[ w_h(p^r) - (p^r - q) w'_h(p^r) \right] - 2 \sum_{i=h, \ell} \pi_i^{b,r} \beta^b_i \lambda_i (1 - \lambda_i)^2 \delta(p^r) w_h(p^r).$$

Next note that

$$(w_h(p) - (p - q) w'_h(p))^' = -(p - q) w''_h(p).$$

This is negative when the production functions are Cobb-Douglas case and zero when both sectors have Leontief technologies. Meanwhile, $\delta(p) w_h(p)$ is declining in $p$. Now consider the case with Leontief technologies. If $p_h > p_{h,\ell}$, then

$$\sum_{i=h, \ell} \pi_i^{b,r} \beta^b_i \lambda_i (1 - \lambda_i)^2 \delta(p_{h,\ell}) w_h(p_{h,\ell}) > \beta^b_h \lambda_h (1 - \lambda_h)^2 \delta(p_h) w_h(p_h).$$

In this case, aggregate material-cum-psychosocial welfare declines with $\pi$ in both regimes $r = (1, 1)$ and $r = (1, 0)$, but it declines more in the former, leading to a populist revolution when $U^{(1,1)}(p_{h,\ell}, q; 1, 1)$ is only slightly larger than $U^{(1,0)}(p_h, q; 1, 1)$.

Finally consider changes in the terms of trade. From (17), we have

$$\frac{\partial U^r(p^r, q; 1, 1)}{\partial q} = - \left( 1 + \alpha + \alpha^b \sum_{i=h, \ell} \lambda_i \pi_i^{b,r} \right) \Omega(p^r).$$

Due to the Envelope Theorem, this represents the full impact of $q$ on aggregate welfare in regime $r$. Evidently, a deterioration of the terms of trade reduces aggregate material-cum-psychosocial welfare. When all individuals identify with the nation, welfare declines by $(1 + \alpha + \alpha^b) \Omega(p_{h,\ell})$ whereas when only the more-skilled workers identify broadly, it declines by $(1 + \alpha + \alpha^b \lambda_h) \Omega(p_h)$. If $p_h > p_{h,\ell}$, the former must larger, because imports decline with $p$. It follows that, when when $U^{(1,1)}(p_{h,\ell}, q; 1, 1)$ is only slightly larger than $U^{(1,0)}(p_h, q; 1, 1)$, a deterioration of the terms of trade leads to a populist revolution.

It remains to derive the conditions under which $p_h > p_{h,\ell}$. To this end, consider the first-order
condition (18) in regimes $r = (1, 1)$,

$$U_p^{(1,1)}(p_{h,\ell}, q) = \left(1 + \alpha + \alpha^b\right) (p_{h,\ell} - q) \Omega' (p_{h,\ell}) - 2 \sum_{i=h,\ell} \beta_i^b \lambda_i (1 - \lambda_i)^2 \delta (p_{h,\ell}) \delta' (p_{h,\ell}) = 0, \quad (28)$$

and the value of $U_p^{(1,0)}(p, q)$ evaluated at $p_{h,\ell}$,

$$U_p^{(1,0)}(p_{h,\ell}, q) = \left(1 + \alpha + \alpha^b \lambda_h\right) (p_{h,\ell} - q) \Omega' (p_{h,\ell}) - 2 \beta_h^b \lambda_h (1 - \lambda_h)^2 \delta (p_{h,\ell}) \delta' (p_{h,\ell}). \quad (29)$$

Substituting (28) into (29) implies that

$$U_p^{(1,0)}(p_{h,\ell}, q) > 0 \text{ if and only if } \beta_h^b \alpha^b (1 - \lambda_h)^2 > \beta_h^b \left(1 + \alpha + \alpha^b \lambda_h\right) \lambda_h, \quad (30)$$

which is condition (12) in the text. This condition is necessary and sufficient for the peak of the $r_{h,\ell}$ curve in Figure 2 to be to the left of the peak of $r_h$.

Note that (29) also implies that the peak of the $r_{h,\ell}$ curve is to the right of the peak of the $r_\ell$ curve. To see why, suppose that the peak of the $r_{h,\ell}$ curve were to the left of the peak of the $r_\ell$ curve and therefore $U_p^{(1,1)}(p_{h,\ell}, q) < 0$. Then (28) together with

$$U_p^{(1,0)}(p_{h,\ell}, q) = \left(1 + \alpha + \alpha^b \lambda_\ell\right) (p_{h,\ell} - q) \Omega' (p_{h,\ell}) - 2 \beta_\ell^b \lambda_\ell (1 - \lambda_\ell)^2 \delta (p_{h,\ell}) \delta' (p_{h,\ell})$$

would imply that $U_p^{(1,0)}(p_{h,\ell}, q) > 0$ if and only if

$$\beta_\ell^b \alpha^b (1 - \lambda_\ell)^2 > \beta_h^b \left(1 + \alpha + \alpha^b \lambda_h\right) \lambda_h.$$

Together with (30) this inequality would imply

$$\frac{\alpha^b (1 - \lambda_\ell)^2}{\left(1 + \alpha + \alpha^b \lambda_\ell\right) \lambda_h} > \frac{\left(1 + \alpha + \alpha^b \lambda_\ell\right) \lambda_\ell}{\alpha^b (1 - \lambda_h)^2},$$

or

$$0 < \alpha^b (1 - \lambda_\ell)^2 \alpha^b (1 - \lambda_h)^2 - \left(1 + \alpha + \alpha^b \lambda_h\right) \lambda_\ell \left(1 + \alpha + \alpha^b \lambda_\ell\right) \lambda_\ell$$

$$= -(1 + \alpha) \lambda_h (1 - \lambda_h) \left(1 + \alpha + \alpha^b\right),$$

which is a contradiction. It follows that $U_p^{(0,1)}(p_{h,\ell}, q) < 0$ when (30) is satisfied, the peak of the $r_\ell$ curve is to the left of the peak of the $r_{h,\ell}$ curve, so tariffs are higher when both groups identify broadly than when only the less-skilled workers do so.

Now suppose that the working class bears an extra cost from envy when they repudiate the elite. This is consistent with research in social psychology that suggest that members of an “in-group”
feel jealousy toward those in the “out-group” who enjoy more material welfare. Suppose that when
the less-skilled workers do not identify broadly with the nation (a group that includes the elites)
they suffer disutility from envy of the elites of \( \lambda_h \gamma (v_h - v_\ell)^2 \), \( \gamma > 0 \), which is proportional to the
number of elites that inspire jealousy and to the square of their shortfall in material well-being. In
such circumstances, the marginal utility from narrow identification \((29)\) is replaced with
\[
U_p^{(1,0)}(p_{h,\ell}, q) = \left(1 + \alpha + \alpha^b \lambda_h\right) (p_{h,\ell} - q) \Omega' (p_{h,\ell}) - 2\beta^b_h \lambda_h (1 - \lambda_h)^2 \delta (p_{h,\ell}) \delta' (p_{h,\ell})
- (1 - \lambda_h) \lambda_h \gamma \delta (p_{h,\ell}) \delta' (p_{h,\ell}).
\]
Substituting \((28)\) into this formula implies that \( U_p^{(1,0)}(p_{h,\ell}, q) > 0 \) if and only if
\[
\beta^b_h \alpha^b (1 - \lambda_h)^2 + \gamma \left(1 + \alpha + \alpha^b\right) > \beta^b_\ell \left(1 + \alpha + \alpha^b \lambda_h\right) \lambda_h.
\]
For \( \gamma > 0 \), this inequality is satisfied for a larger range of \( \lambda_h \) than \((30)\).

Section 6

We turn to the case in which the parties compete for the favor of the median voter. We first
consider the impact of technical change on the rate of protection. Using the factor-augmenting
coefficients \( \pi_h \) and \( \pi_\ell \) and \((13)\), the marginal impact of an increase in \( p \) on \( U_p^\mu (\cdot) \) can be expressed as
\[
U_p^\mu (p, q; \pi_h, \pi_\ell) = \left(1 + \alpha + \alpha^b \pi_h^\mu \right) (p - q) \Omega' (p; \pi_h, \pi_\ell)
- \lambda_h \left[1 + \alpha + 2\beta^b_\ell \lambda_h \delta (p; \pi_h, \pi_\ell) \right] \delta' (p; \pi_h, \pi_\ell). \tag{31}
\]
Initially, \( \pi_s = \pi_u = 1 \), and the equilibrium domestic price \( p^\mu \) is characterized by the first-order
condition,
\[
U_p^\mu (p^\mu, q; 1, 1) = \left(1 + \alpha + \alpha^b \pi_\ell^\mu \right) (p^\mu - q) \Omega' (p^\mu; 1, 1)
- \lambda_h \left[1 + \alpha + 2\beta^b_\ell \lambda_h \delta (p^\mu; 1, 1) \right] \delta' (p^\mu; 1, 1) = 0. \tag{32}
\]
For technical change of the form
\[
d \pi_h = \rho d \pi, \\
d \pi_\ell = d \pi > 0,
\]
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(31) implies
\[
\text{sign} \frac{\partial p^\mu}{\partial \pi} = \text{sign} \left[ \frac{\partial}{\partial \pi} U^\mu_p (p^\mu, q, \pi_h, \pi_\ell) + \rho \frac{\partial}{\partial \pi_h} U^\mu_p (p^\mu, q, \pi_h, \pi_\ell) \right]_{\pi_h = \pi_\ell = 1} \tag{33}
\]
\[
= \text{sign} \left[ \sum_{i=h,\ell} \frac{\partial}{\partial \pi_i} U^\mu_p (p^\mu, q, \pi_h, \pi_\ell) + (\rho - 1) \frac{\partial}{\partial \pi_h} U^\mu_p (p^\mu, q, \pi_h, \pi_\ell) \right]_{\pi_h = \pi_\ell = 1}.
\]

From (31) and (15) we obtain
\[
\left[ \sum_{i=h,\ell} \frac{\partial}{\partial \pi_i} U^\mu_p (p^\mu, q, \pi_h, \pi_\ell) \right]_{\pi_h = \pi_\ell = 1} = - \left( 1 + \alpha + \alpha^b h^b \mu \right) (p^\mu - q) Y'_Z (p^\mu; 1, 1) \]
\[
- \lambda_h \left[ 1 + \alpha + 4 \beta h^b \mu \lambda_h \delta (p^\mu; 1, 1) \right] \delta' (p^\mu; 1, 1).
\]

Subtracting (32) from this equation yields
\[
\left[ \sum_{i=h,\ell} \frac{\partial}{\partial \pi_i} U^\mu_p (p^\mu, q, \pi_h, \pi_\ell) \right]_{\pi_h = \pi_\ell = 1}
= - \left( 1 + \alpha + \alpha^b h^b \mu \right) (p^\mu - q) C'_Z (p^\mu) - \lambda_h 2 \beta h^b \mu \lambda_h \delta (p^\mu; 1, 1) \delta' (p^\mu; 1, 1) > 0.
\]

It follows that Hicks-neutral technical change must increase the equilibrium tariff rate. Next, use (31) and (15) to obtain
\[
\frac{\partial}{\partial \pi_h} U^\mu_p (p^\mu, q, \pi_h, \pi_\ell) \bigg|_{\pi_h = \pi_\ell = 1} = - \left( 1 + \alpha + \alpha^b h^b \mu \right) (p^\mu - q) w'_h (p^\mu) \lambda_h
\]
\[
- \lambda_h \left[ 1 + \alpha + 2 \beta h^b \mu \lambda_h \delta (p^\mu; 1, 1) \right] w'_h (p^\mu) - \lambda_h 2 \beta h^b \mu \lambda_h w_h (p^\mu) \delta' (p^\mu; 1, 1).
\]

The right-hand side is positive for \( w'_h (p^\mu) \leq 0 \). In such circumstances, (purely) skilled-biased technical change raises the rate of protection. And, like in the case in which the trade policy maximizes utilitarian welfare, skill-augmenting technical change can generate an increase in the tariff rate even when \( w'_h (p^\mu) > 0 \).

We now consider the impact of an improvement in the terms of trade, \( dq < 0 \), on the rate of protection preferred by the median voter. The first-order condition \( U^\mu_p (p^\mu, q) = 0 \) implies
\[
\frac{\partial t^\mu}{\partial q} \times \frac{q}{1 + t^\mu} = - \frac{1}{U^\mu_{pp} [(1 + t^\mu) q, q]} \left[ U^\mu_{pq} [(1 + t^\mu) q, q] + U^\mu_{qq} [(1 + t^\mu) q, q] \right],
\]
where \( U^\mu_{pp} [(1 + t^\mu) q, q] \) is the derivative of \( U^\mu_p [(1 + t^\mu) q, q] \) with respect to the second argument. Note, from (14), that
\[
U^\mu_{pq} [(1 + t^\mu) q, q] = - \left( 1 + \alpha + \alpha^b h^b \mu \right) \Omega' (p^\mu),
\]

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which implies

\[
\frac{\partial t^\mu}{\partial q} \times \frac{q}{1 + t^\mu} = -1 + \frac{1 + \alpha + \alpha b_{t} b_{k}}{p^\mu U_{pp}^\mu (p^\mu, q)} q \Omega' (p^\mu).
\]

This expression is negative if and only if

\[
\left(1 + \alpha + \alpha b_{t} b_{k}\right) q \Omega' (p^\mu) > p^\mu U_{pp}^\mu (p^\mu, q).
\]

Using (14) to compute \(U_{pp}^\mu (\cdot)\), this inequality is equivalent to

\[
\left(1 + \alpha + \alpha b_{t} b_{k}\right) q \Omega' (p^\mu) > p^\mu \left(1 + \alpha + \alpha b_{t} b_{k}\right) [\Omega' (p^\mu) + (p^\mu - q) \Omega'' (p^\mu)]
\]

\[-p^\mu \lambda_h \left[1 + \alpha + 2 \beta b_{t} b_{k} \lambda_h \delta (p^\mu)\right] \delta'' (p^\mu) - p^\mu \lambda_h 2 \beta b_{t} b_{k} \lambda_h \delta' (p^\mu)^2.
\]

Substituting the first-order condition \(U_{p}^\mu (p^\mu, q) = 0\) and (14) into the inequality then yields

\[
\frac{p^\mu \Omega' (p^\mu)}{\Omega' (p^\mu)} + \frac{2 \beta b_{t} b_{k} \lambda_h \delta (p^\mu)}{1 + \alpha + 2 \beta b_{t} b_{k} \lambda_h \delta (p^\mu)} \frac{p^\mu \delta' (p^\mu)}{\delta (p^\mu)} + \frac{p^\mu \delta'' (p^\mu)}{\delta' (p^\mu)} < 1.
\]

It follows that an improvement in the terms of trade raises the tariff preferred by the median voter if and only if the last inequality is satisfied. This condition is very similar to condition (27), the difference being only the weight in front of \(p^\mu \delta' (p^\mu) / \delta (p^\mu)\), which is smaller here. Because \(p^\mu \delta' (p^\mu) / \delta (p^\mu) < 0\), the condition for a rise in the tariff is less likely to be satisfied when the median voter’s preferences determine the policy choice.

**Ethnic Identities**

We distinguish two ethnicities in the population, an ethnic majority, \(M\), and an ethnic minority, \(m\). Although every individual bears one ethnicity or the other, individuals may or may not choose to identify with their ethnic group, depending on the composition of their group in socioeconomic terms. We introduce a third skill level to our model of Section 2 and designate the three skills by \(h\) (high), \(\ell\) (medium) and \(k\) (low). Having a third skill level gives us greater flexibility in aligning ethnicities and socioeconomic standing with interests in protectionist policies.

The economy now produces three goods. Two goods are tradable: an export good, \(X\), and an import-competing good, \(Z\), are produced with constant returns to scale by \(h\) and \(\ell\), much as before. The export good uses high-skilled labor relatively intensively, whereas the import-competing good uses middle-skilled labor relatively intensively. The third good, \(S\), is a nontraded service. It is produced by low-skilled workers, with one unit of output per unit of labor. Let \(p_S\) be the price of the service. Low-skilled workers earn the competitive wage, \(w_k = p_S\).

All individuals have quasi–linear preferences and devote residual income after optimal spending on the import good and the nontraded service to the export good. We represent the material
well-being of an individual in skill group $i$ by

$$v_i(p, q, p_S) = w_i(p) + \tilde{T}(p, q, p_S) + \tilde{\Gamma}(p, p_S), \quad i = h, \ell, k,$$

(34)

where $\tilde{\Gamma}(p, p_S)$ is consumer surplus from combined purchases of the import good and the nontraded service and where tariff revenues $\tilde{T}(\cdot)$ now depend on the price of the nontraded service, because demand for the import good $Z$ depends on this price. The consumer surplus function is given by

$$\tilde{\Gamma}(p, p_S) = \max_{c_Z, c_S} v(c_Z, c_S) - pc_Z - p_sc_S,$$

(35)

where $v(\cdot)$ is the surplus from devoting spending to the import good and the nontraded service. The solution to this problem generates demand functions $\tilde{C}_Z(p, p_S)$ and $\tilde{C}_S(p, p_S)$ that do not depend on income as long as the individual consumes all three products. The demand function $\tilde{C}_Z(p, p_S)$ is decreasing in $p$, and it is also decreasing in $p_S$ if and only if $v_{ZS}(c_Z, c_S) > 0$, where

$$v_{ZS}(c_Z, c_S) = \frac{\partial^2 v(c_Z, c_S)}{\partial c_Z \partial c_S}.$$

Similarly, $\tilde{C}_S(p, p_S)$ is declining in $p_S$, and it is also declining in $p$ if and only if $v_{ZS}(c_Z, c_S) > 0$. The product-market clearing condition for services is $\tilde{C}_S(p, p_S) = \lambda_S$. This implies that $p_S$ is a function of $p$—which we write as $p_S(p)$—and that $p_S$ is decreasing in $p$ if and only if $v_{ZS}(c_Z, c_S) > 0$; i.e., if and only if good $Z$ and service $S$ are complements in consumption. Since $w_k(p) = p_S(p)$, the wage rate of low-skilled workers also is decreasing in $p$ if and only if $v_{ZS}(c_Z, c_S) > 0$.

We allow for a rich pattern of potential social identities. In regime $r$, individuals with ethnicity $j$ and skill level $i$ may identify with others of their same ethnicity ($\overline{I}^{j,r}_i = 1$) or not ($\overline{I}^{j,r}_i = 0$). These same individuals may identify with others in their same social class ($\overline{I}^{j,s}_i = 1$) or not ($\overline{I}^{j,s}_i = 0$). And they may identify with a broad group of nationals ($\overline{I}^{j,n}_i = 1$) or not ($\overline{I}^{j,n}_i = 0$). We take the psychological benefit to an individual from identifying with any group to be a linearly increasing function of the material well-being of the prototypical member of the group, where the prototype is the average among individuals with the specified characteristics. That is, the benefit from identifying with ethnic group $j$ is $\alpha^e \left( \sum_i \lambda^j_i \nu_i \right) / \lambda^j$, where $\alpha^e$ is a constant that is common across ethnicities, $\lambda^j_i$ is the fraction of individuals with skill level $i$ and ethnicity $j$, and $\lambda^j$ is the fraction of individuals with ethnicity $j$ in the total population. Similarly, the benefit from identifying with social class $i$ is $\alpha^s \nu_i$, where $\alpha$ is another constant, possibly different from $\alpha^e$. Finally, the benefit to individuals with skill level $i$ achieve the same level of material well-being, independent of their ethnicity. Thus, $\nu^M_i = \nu^M_i$ for $i = h, \ell, k$. 

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32 It is also possible that the sociocultural environment affords as well the opportunity for individuals to identify with a narrow group defined by both class and ethnicity. For example, in the U.S. context, much has been made of late about political trends driven by the “white working class.” In our model, the group of individuals with skill level $i$ and ethnicity $j$ is homogeneous, so if social identity groups defined by a given combination of class and ethnicity exist and if the status associated with each of them is positive, then everyone would choose to identify with theirs. This would affect the level of trade protection in the initial equilibrium, but would not affect the predicted response to any narrowing of self-identification due to growing ethnic or racial sensitivities.

33 Note that all individuals with skill level $i$ achieve the same level of material well-being, independent of their ethnicity. Thus, $\nu^M_i = \nu^M_i = \nu_i$ for $i = h, \ell, k$. 

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any individual from identifying broadly with the nation is \( \alpha h \sum_i \lambda_i \nu_i \).

Dissonance costs now have two components. The first component is proportional to the squared distance in the space of material well-being, as before. For individuals with skill \( i \) who identify with some group \( g \), this cost is \( \beta (\nu_i - \bar{\nu}_g)^2 \), where \( \bar{\nu}_g \) is the average material well-being among those with the characteristics associated with group \( g \). The second component is proportional to the squared distance in “ethnic space.” Without loss of generality, we assign individuals in the majority an ethnic value of one \( (E^M = 1) \) and individuals in the minority an ethnic value of zero \( (E^m = 0) \), so that the distance between them is one. The second component of psychological cost for individuals with ethnicity \( j \) who identify with some group \( g \) is \( \beta_e (E^j - E^g)^2 \), where \( E^g \) is the average ethnicity among those in group \( g \). Notice that this cost component is zero when an individual identifies with a group comprised only of others that share the same ethnicity as she.

We are interested in the effects of increases in \( \beta_e \) on the equilibrium trade policy. Arguably, \( \beta_e \) has risen in recent years due in part to the efforts by some politicians to highlight and amplify the salience of ethnic and racial differences in political discourse.

The political objective, \( U^r (p, q) \), now is the sum of material and psychosocial components of utility across individuals with all possible combinations of skill level and ethnicity. Aggregate material utility equals GDP at domestic prices plus tariff revenue plus consumer surplus. The status benefits from identifying broadly with the nation are proportional to this for all individuals that opt to do so. The cost combines elements that reflect distance from the average wage in the population and distance from the average ethnicity. For those individuals that identify with their skill group there is an additional psychological gain that is proportional to the sum of that group’s wage, tariff revenue and consumer surplus and a psychological cost that depends on the ethnic composition of their skill group. For those that identify with their ethnic group, the status benefit reflects the average material welfare of those with the same ethnicity and the cost reflects the distance of the individual from the ethnic group’s average wage.\(^{34}\)

Substituting \( p_S (p) \) into \( \tilde{\Gamma} (p, p_S) \) yields the consumer surplus function,

\[
\Gamma (p) \equiv \tilde{\Gamma} [p, p_S (p)],
\]

from which we obtain

\[
\Gamma' (p) = -C_Z (p) - C_S (p) p'_S (p),
\]

where

\[
C_Z (p) \equiv \tilde{C}_Z [p, p_S (p)],
\]

\[
C_S (p) \equiv \tilde{C}_S [p, p_S (p)].
\]

\(^{34}\)If individuals can identify with others that share the same combination of skill and ethnicity as themselves, they will enjoy an additional psychological benefit that is proportional to the material well-being of their social class. Because these narrow groups are homogeneous in skill and ethnicity, there would be no offsetting dissonance cost.
Using the price function for services, we also obtain

\[ T(p, q) = \tilde{T}[p, q, p_S(p)] = (p - q) \Omega(p), \]

where

\[ \Omega(p) = C_Z(p) - Y_Z(p). \]

It follows that

\[ \nu_i = w_i(p) + T(p, q) + \Gamma(p) \quad \text{for } i = h, \ell, k. \]

Finally, GDP can be represented by

\[ Y(p) = \sum_{i=h,\ell,k} \lambda_i w_i(p) \equiv Y_X(p) + pY_Z(p) + p_S(p) \lambda_k. \]

This implies

\[ Y'(p) = \sum_{i=h,\ell,k} \lambda_i w_i'(p) \equiv Y'_{Z}(p) + p'_{S}(p) \lambda_k, \]

because \( Y'_X(p) + pY'_Z(p) = 0. \) It follows that aggregate material well-being, \( \sum_{i=h,\ell,k} \lambda_i \nu_i, \) equals

\[ Y(p) + T(p, q) + \Gamma(p), \]

and the partial with respect to the domestic price is

\[ Y'(p) + T'(p, q) + \Gamma'(p) = Y'_Z(p) + p'_S(p) \lambda_k + \Omega(p) + (p - q) \Omega'(p) + \Gamma'(p) \]
\[ = (p - q) \Omega'(p), \]

which is similar to the case without the service sector.

The aggregate utility function \( U^r(p, q) \) consists of the sum of individuals’ material well-being plus the sum of the psychosocial components of individual welfare that derive from identification.
choices. That is,

\[ U^r (p, q) = Y (p) + T (p, q) + \Gamma (p) \]

\[ + \sum_{j=M,m} \sum_{i=h,l,k} \lambda^j_{i,j,k} \left\{ A^j_{i,i} + \alpha [w_i (p) + T (p, q) + \Gamma (p)] - \beta^e \left( E^j - \sum_{\eta=M,m} \frac{\lambda^\eta_i}{\lambda_i} E^\eta \right)^2 \right\} \]

\[ + \sum_{j=M,m} \sum_{i=h,l,k} \lambda^j_{i,j,k} \left\{ A^j_{i,j} + \alpha^e \left[ \sum_{\ell=h,l,k} \lambda^j_{i,j} w_i (p) + T (p, q) + \Gamma (p) \right] - \beta \left[ w_i (p) - \sum_{i=h,l,k} \frac{\lambda^j_i}{\lambda_i} w_i (p) \right]^2 \right\} \]

\[ + \sum_{j=M,m} \sum_{i=h,l,k} \lambda^j_{i,j,k} \left\{ A^j_{i,j} + \alpha^b \left[ Y (p) + T (p, q) + \Gamma (p) \right]\right\} \]

\[ - \sum_{j=M,m} \sum_{i=h,l,k} \lambda^j_{i,j,k} \left\{ \beta \left[ w_i (p) - \sum_{i=h,l,k} \lambda_i w_i (p) \right]^2 + \beta^e \left( E^j - \sum_{\eta=M,m} \frac{\lambda^\eta_i}{\lambda_i} E^\eta \right)^2 \right\}. \]

The first line on the right-hand side of this equation represents aggregate material well-being. The second line represents the contribution to aggregate welfare of the identification of various individuals with their own social class. An individual with skill level \( i \) and ethnicity \( j \) identifies with her social class if and only if

\[ A^j_{i,i} + \alpha [w_i (p) + T (p, q) + \Gamma (p)] - \beta^e \left( E^j - \sum_{\eta=M,m} \frac{\lambda^\eta_i}{\lambda_i} E^\eta \right)^2 \geq 0; \]

that is, if and only if the status provided by the social group is larger than the dissonance cost. Inasmuch as each worker has the same material well being as every other member of her social class, the dissonance cost arises solely from the fact that the groups exhibit ethnic diversity. With our normalization of \( E^M = 1 \) and \( E^m = 0 \), we obtain

\[ \beta^e \left( E^j - \sum_{\eta=M,m} \frac{\lambda^\eta_i}{\lambda_i} E^\eta \right)^2 = \beta^e \left( \frac{\lambda^{-j}_i}{\lambda_i} \right)^2, \]

where \( \lambda^{-j}_i \) is the fraction of individuals with skill \( i \) who are not of ethnicity \( j \). A higher value of \( \beta^e \) raises the cost of identification in a group of mixed ethnicities.\(^{35}\)

The third line in the expression for \( U^r (p, q) \) represents the contribution to aggregate welfare of the identification of various individuals with others that share their ethnicity. An individual with skill level \( i \) and ethnicity \( j \) identifies with her own ethnic group if and only if

\[ A^j_{i,j} + \alpha^e \left[ \sum_{\ell=h,l,k} \lambda^j_{i,j} w_i (p) + T (p, q) + \Gamma (p) \right] - \beta \left[ w_i (p) - \sum_{i=h,l,k} \frac{\lambda^j_i}{\lambda_i} w_i (p) \right]^2 \geq 0. \]

\(^{35}\)We assume as before that no individual identifies with a social class different from her own, because, the dissonance costs are too great.
Here, the cost of identification depends only on the difference between the individual’s material well-being and the average for the group, because each individual shares the same ethnicity with the prototypical member of her ethnic group. We assume that no individual identifies with an ethnic group that is not her own.

The fourth line in the expression for $U_r(p, q)$ represents the positive contribution to aggregate welfare of the status that derives from identifying with the nation, while the fifth line represents the dissonance cost of such identification. An individual of ethnicity $j$ with skill level $i$ identifies with the broad nation if and only if

$$A_i^{j,b} + \alpha^b[Y(p) + T(p, q) + \Gamma(p)] - \beta \left[ w_i(p) - \sum_{\ell=h,\ell,k} \lambda_iw_i(p) \right]^2 - \beta^e \left( E^j - \sum_{\mu=M,m} \lambda^\mu E^\mu \right)^2 \geq 0.$$  

Here the cost of identification depends both on the distance of the individual’s material well-being from the average in the country and her distance from the average ethnicity value in the country. The latter is

$$\beta^e \left( E^j - \sum_{\eta=M,m} \lambda^\eta E^\eta \right)^2 = \beta^e \left( \lambda^{-i} \right)^2.$$  

For a given identification regime $r$, the marginal contribution to aggregate welfare of an increase in $p$ is

$$U_r^r(p, q) = \left( 1 + \alpha \sum_{j=M,m} \sum_{i=h,\ell,k} \lambda_{i,j}^{j,b,r} + \alpha^e \sum_{j=M,m} \sum_{i=h,\ell,k} \lambda_{i,j}^{j,j,r} + \alpha^b \sum_{j=M,m} \sum_{i=h,\ell,k} \lambda_{i,j}^{j,b,r} \right) (p - q) \Omega'(p)$$

$$+ \alpha \sum_{j=M,m} \sum_{i=h,\ell,k} \lambda_{i,j}^{j,i,r} \left[ w_i'(p) - \sum_{\ell=h,\ell,k} \lambda_i w_i'(p) \right]$$

$$+ \alpha^e \sum_{j=M,m} \sum_{i=h,\ell,k} \lambda_{i,j}^{j,j,r} \left[ \sum_{\ell=h,\ell,k} \frac{\lambda_j^i}{\lambda^i} w_i'(p) - \sum_{\ell=h,\ell,k} \lambda_i w_i'(p) \right]$$

$$- 2\beta \sum_{j=M,m} \sum_{i=h,\ell,k} \lambda_{i,j}^{j,j,r} \left[ w_i(p) - \sum_{\ell=h,\ell,k} \frac{\lambda_j^i}{\lambda^i} w_i(p) \right] \left[ w_i'(p) - \sum_{\ell=h,\ell,k} \lambda_i w_i'(p) \right]$$

$$- 2\beta \sum_{j=M,m} \sum_{i=h,\ell,k} \lambda_{i,j}^{j,b,r} \left[ w_i(p) - \sum_{\ell=h,\ell,k} \lambda_i w_i(p) \right] \left[ w_i'(p) - \sum_{\ell=h,\ell,k} \lambda_i w_i'(p) \right].$$

Evidently, $U_p^r(p, q)$ does not depend on the distance in ethnic space. Therefore, changes in $\beta^e$ that do not induce changes in identification have no effect on trade policy. This is stated in the following

**Proposition 5** Suppose that a change in $\beta^e$ does not induce a change in identification regime. Then the equilibrium tariff rate is not affected.

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Now consider an equilibrium with some identification regime \( r \) in which individuals with skill level \( i \) and ethnicity \( j \) identify with the nation. Let \( p^r \) be the associated domestic relative price of the import good. Assuming an interior solution, this price is characterized by

\[
U_p^r (p^r, q) = 0.
\]

We do not restrict any of the remaining components of the identification regime. Thus, for example, other persons may or may not identify with the nation and may or may not identify with their own ethnic groups. But we do assume that \( p^r > q \), i.e., that the initial equilibrium has a positive tariff.

Now suppose that a change in either \( e \) or \( A^j_i \) induces individuals with skill \( i \) and ethnicity \( j \) to stop identifying with the broad nation, but that other identification choices remain as before. Let \( r = r^j_i \) represent the new identification regime and let \( p^{j_i} \) represent the new domestic price of the import good. Then \( p^{j_i} > p^r \) if and only if

\[
U_p^{r^{j_i}} (p^r, q) - U_p^r (p^r, q) = U_p^{r^{j_i}} (p^r, q) > 0.
\]

But (36) yields

\[
U_p^{r^{j_i}} (p^r, q) - U_p^r (p^r, q) = -\alpha^b \lambda_i^j (p^r - q) \Omega' (p^r)
\]

\[+ 2\beta \lambda_i^j \left[ w_i (p^r) - \sum_{\ell=h,\ell,k} \lambda_i w_i (p^r) \right] \left[ w_i' (p^r) - \sum_{\ell=h,\ell,k} \lambda_i w_i' (p^r) \right].
\]

The first term on the right-hand side of this equation is positive, implying that \( p^{j_i} > p^r \) if

\[
\left[ w_i (p^r) - \sum_{\ell=h,\ell,k} \lambda_i w_i (p^r) \right] \left[ w_i' (p^r) - \sum_{\ell=h,\ell,k} \lambda_i w_i' (p^r) \right] \geq 0. \tag{37}
\]

Note that, by assumption, \( w_h (p^r) > w_\ell (p^r) > w_k (p^r) \). That is, the high-skilled workers are paid the highest wages while the low-skilled workers earn the lowest wages. Medium-skilled workers have intermediate wages between those of the other two skill groups. Then, the first term in the square bracket on the right hand side of (37) is negative for \( i = k \) and positive for \( i = h \). For \( i = \ell \) it is positive if medium-skilled workers have a wage that is higher than the average and negative otherwise. For \( i = k \), the term in the second square bracket is negative if the import-competing good and the nontraded service are gross complements in consumption. The reason is that in this case \( w'_k (p^r) < 0 \) and therefore

\[
w'_k (p^r) - \sum_{\ell=h,\ell,k} \lambda_i w'_i (p^r) = (1 - \lambda_k) w'_k (p^r) - \sum_{\ell=h,\ell} \lambda_i w'_i (p^r)
\]

\[= (1 - \lambda_k) w'_k (p^r) - Y_Z (p^r) < 0 .
\]
In these circumstances, the tariff rate jumps upward when the least-skilled of either ethnicity cease to identify broadly with the nation.

If the medium-skilled individuals of either ethnicity cease to identify with the nation, the term in the second square brackets becomes

$$w'_k(p^r) - \sum_{i=h, \ell, k} \lambda_i w'_i(p^r) = (1 - \lambda_\ell) w'_\ell(p^r) - \sum_{i=h, k} \lambda_i w'_i(p^r).$$

This expression is positive when the import-competing good and the nontraded service are gross complements in consumption, because, in this case, \( w'_k(p^r) < 0 \) while the Stolper-Samuelson theorem implies that \( w'_\ell(p^r) > 0 \) and \( w'_h(p^r) < 0 \). It follows that the rate of protection jumps upward when medium-skilled workers of either ethnicity cease to identify with the broad nation, if these workers happen to earn a wage of at least the national average.

Finally, consider \( i = h \). If such workers of either ethnicity end their national identification, the term in the first square bracket of (37) is positive. The term in the second square bracket can be expressed as

$$w'_h(p^r) - \sum_{i=h, \ell, k} \lambda_i w'_i(p^r) = w'_h(p^r) - \lambda_k w'_k(p^r) - Y_Z(p^r).$$

This expression is negative if the import-competing good and the nontraded service are gross substitutes in consumption, in which case \( w'_k(p^r) > 0 \). But if they are gross complements in consumption, the expression cannot be signed. So, the net effect is ambiguous.

Now consider an initial equilibrium with some identification regime \( r \) and equilibrium price \( p^r \) in which individuals of ethnicity \( j \) and skill level \( i \) initially identify with their own social class; \( \Pi_{i,j}^r = 1 \). Suppose that an increase in \( \beta^r \) leads them to end such identification, but does not affect other identity choices. This results in a new identification regime \( r^d_{i,-i} \) and a new policy \( p^r_{i,-i} \). The new policy entails a higher rate protection if and only if

$$U'_{r^d_{i,-i}}(p^r, q) - U'_p(p^r, q) > 0.$$ 

In the present circumstances, (36) yields

$$U'_{r^d_{i,-i}}(p^r, q) - U'_p(p^r, q) = -\alpha \lambda_i^d \left[ (p^r - q) \Omega'(p^r) + w'_i(p^r) - \sum_{i=h, \ell, k} \lambda_i w'_i(p^r) \right].$$

Since \( (p^r - q) \Omega'(p^r) < 0 \), the right-side of this equation is positive, implying that \( p^r_{i,-i} > p^r \), if

$$w'_i(p^r) (1 - \lambda_i) \leq \sum_{i \neq i} \lambda_i w'_i(p^r).$$

(38)

For \( i = k \), the expression on the left-hand side of (38) is negative if the import-competing good and the nontraded service are gross substitutes in consumption, and the expression on the right-
hand side of (38) is positive in this case, because it equals $Y_Z(p^r)$. Under these conditions, the inequality is satisfied, which implies that the tariff rate jumps upward if the low-skilled workers of either ethnicity cease to identify with others in their social class. For $i = \ell$, the expression on the left-hand side is positive while the expression on the right-hand side is negative when the import-competing good and the nontraded service are gross complements, in which case the inequality is violated. So, in this case, we cannot predict whether the tariff rate jumps upward or downward. Finally, for $i = h$, the left-hand side is negative while the right-hand side has one positive term, $\lambda_tw_\ell(p^r)$, and one negative term (in the case of gross complementarity), $\lambda_kw_h(p^r)$. It follows that we cannot predict the direction of change in the equilibrium tariff.

We conclude that changes in self-identification that result from heightened sensitivity to ethnic differences can destabilize trade policy, but the nature of the policy response will vary with the economic and political circumstances. The following proposition records our sharpest predictions:

**Proposition 6** Suppose that $\beta^e$ rises and that the import good $Z$ and the nontraded service $S$ are gross complements in demand. If the least-skilled workers of any ethnicity cease to identify with the broad nation or with their social class, the rate of protection jump upwards. If the middle-skilled workers of any ethnicity cease to identify with the broad nation and if their wage is at least as great as the economy-wide average, then the rate of protection jumps upward.

We have shown in this appendix how the deepening of racial or ethnic divisions in society can lead to changes in trade policies in certain circumstances. If interracial or interethnic tensions intensify, individuals may cease to identify with groups of others that share common socio-economic attributes but are heterogeneous along these other dimensions. When individuals narrow the purview of their social identification, they may no longer consider the economic standing of the broader group to be a source of pride, nor the income inequality within the group as a source of dissonance. The change in their material-plus-psychosocial utility evaluation alters their policy preferences. Thus, switches in social identity that have entirely non-economic roots can generate protectionist political responses when individuals’ altruistic preferences extend only so far as the limits of their self-identification.