# Intersectoral Distributional Effects of Deregulation and Privatization in a Closed Economy

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**Abstract:** We develop a simple general equilibrium model of a closed dual economy. The manufacturing sector is modeled with monopolistically competitive firms, union-firm wage bargaining, employment protection and efficiency wages. In the traditional sector, product and labor markets are assumed to be perfectly competitive. It is shown that all four market imperfections jointly cause and magnify intersectoral wage differentials. Since a) labor market deregulation reduces union bargaining power and employment protection, and b) product market deregulation curbs firms' monopoly power, intersectoral wage inequality should decrease in the process of deregulation. In the case of privatization, however, intersectoral distributional effects are ambiguous due to efficiency wage effects.

**Key Words:** Efficiency Wages, Trade Unions, Employment Protection, Dual Economy, Intersectoral Wage Differentials, Deregulation, Privatization

**JEL Classification:** E25, J31, J41, J51, L16

# I Introduction

Rigidities in product and labor markets are considered to be at the root of poor economic performance in many countries. To achieve sustainable economic growth, international organizations, such as IMF, World Bank and OECD, have advocated deregulation and privatization.[1] There is widespread consensus that such policy reforms help restore macroeconomic and fiscal stability. But still they often lack political support. The key to understanding these political economy constraints is to have a closer look at the distributional effects of deregulation and privatization.

In this paper, we focus on the impacts of a wide range of policy reforms on intersectoral wage differentials.[2] In Section 2, we start by developing a simple general equilibrium model of a closed dual economy with a) imperfect competition in the product market as well as b) union-firm wage bargaining, c) employment protection and d) efficiency wages in the labor market of the manufacturing sector. The impacts of these market imperfections on the labor market equilibrium have long been discussed in the literature.[3] More recently, the interactions between these effects have been analyzed. Nickell et al. (1994) show that monopoly power of firms and bargaining power of unions jointly contribute to intersectoral wage differentials. The link between union-firm bargaining and efficiency wages as complementary theories to explain sectoral wage premia was explored by

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1 See, for example, OECD (1994).

2 That is wage differentials which cannot be explained by personal characteristics of the individual worker but which are due to the sectoral affiliation of her employer.

3 See, for example, Nickell (1999) and Gersbach (1999) on imperfectly competitive product markets, Nickell (1997) and Siebert (1997) on union-firm bargaining and employment protection, and Weiss (1991) on efficiency wages.

Garino and Martin (2000). By integrating all four types of market imperfections into a single model, we intend to proceed further on this path.

In section 3, we apply the model to study the impacts of deregulation and privatization on the labor market equilibrium. Following Blanchard and Giavazzi (2001), we introduce these policy reforms in a highly abstract fashion by discussing their impact on those model parameters which reflect the above mentioned market imperfections.[4] We then show that product and labor market deregulation reduce intersectoral wage inequality, while the distributional effects of privatization are ambiguous due to efficiency wage effects. Section 4 concludes.

# II The Model

## II.1 Product Markets

On the production side, we assume a dual economy. In the manufacturing sector, $J$ monopolistically competitive intermediate good producers make $J$ inputs $V_j$, which are subsequently transformed into one composite manufactured good $M$ by numerous perfectly competitive final good producers. The market structure of the traditional sector, which produces the traditional good $T$, is also perfectly competitive.

The final good of the manufacturing sector is produced using all inputs but no labor according to the constant-returns-to-scale CES technology

4 For a comprehensive empirical survey on the labor market implications of deregulation see Boeri et al. (2000).

$$M=\left[J^{-\frac{1}{s}}\sum_{j=1}^{J}V_j^{\frac{s-1}{s}}\right]^{\frac{s}{s-1}},\quad V_j\geq 0\;\forall\; j=1,...,J,\quad s>1, \tag{1}$$

where $s$ is the absolute value of the elasticity of substitution between inputs. Profit maximization by the representative final good producer yields her price-setting rule and her demand for input *j*

$$P_M=\left[\frac{1}{J}\sum_{j=1}^{J}P_{V_j}^{1-s}\right]^{\frac{1}{1-s}}, \tag{2}$$

$$V_j=\left(\frac{P_{V_j}}{P_M}\right)^{-s}\cdot\frac{M}{J}, \tag{3}$$

where $P_M$ and $P_{V_j}$ are the prices of *M* and $V_j$. The price of the manufactured good is set equal to marginal costs so that final good producers make zero profits. Input demand is decreasing in input prices with an elasticity of

$$e_{V_j,P_{V_j}}=-s, \tag{4}$$

The production function of intermediate good producer $j=1,...,J$ is given by

$$V_j=A_jE_jL_{V_j}. \tag{5}$$

Supply of the input *j* depends on the number of production workers $L_{V_j}$, effort $E_j$ and the level of technology $A_j$. Effort is a function of the wage paid by firm *j*, $W_{V_j}$, relative to the expected outside wage *Z*. Following Summers (1988), we assume

$$E_j=\left(\frac{W_{V_j}-Z}{Z}\right)^{g_j},\quad 0\leq g_j<1, \tag{6}$$

where the efficiency wage parameter $g_j$ measures the strength of the relationship between wage and labor productivity of production workers. Additionally, firm *j's* workforce $N_{V_j}$ consists of $F_{V_j}$ non-production workers, who are assumed to receive the same wage as production workers.

Maximizing firm *j's* profits[5] subject to the input demand function of the representative final good producer implies

$$P_{V_j} = q_P \cdot \frac{W_{V_j}}{A_j E_j} = \frac{s}{s-1} \cdot \frac{W_{V_j}}{A_j E_j}. \tag{7}$$

$$L_{V_j} = \left(A_j E_j\right)^{s-1} \cdot \left( \frac{\frac{s}{s-1} W_{V_j}}{P_M} \right)^{-s} \cdot \frac{M}{J}, \tag{8}$$

(7) states that intermediate good producers can set prices as a mark-up $q_P$ on marginal costs. According to (8), labor demand is decreasing in wages with an elasticity of

$$e_{L_{V_j}, W_{V_j}} = -s + (s-1) \cdot g_j \cdot \frac{W_{V_j}}{W_{V_j} - Z}. \tag{9}$$

In the traditional sector, labor productivity of workforce $N_T$ is constant and normalized to one, i.e.,

$$T = N_T. \tag{10}$$

On perfectly competitive product markets, firms set prices equal to marginal costs, which implies

$$P_T = W_T, \tag{11}$$

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5 The profits of intermediate good producer *j* are $\Pi_{V_j} = P_{V_j} V_j - W_{V_j} \cdot \left(L_{V_j} + F_{V_j}\right)$.

where $W_T$ is the wage paid in the traditional sector. Firms make zero profits.

On the demand side, consumer $i = 1,...,N$ solves the optimization problem

$$\max_{\{M_i, T_i\}} U_i = M_i^{m_i} T_i^{1-m_i}, \quad 0 < m_i < 1,$$
$$\text{s.t.} \quad Y_i = P_M M_i + P_T T_i, \tag{12}$$
$$\text{with} \quad Y_i = \begin{cases} W_{V_j}, \text{if } i \text{ is employed by intermedia te good producer } j \\ W_T, \text{if } i \text{ is employed in the secondary sector} \end{cases}$$

allocating income $Y_i$ to the consumption of $M$ and $T$ according to

$$\frac{M_i}{T_i} = \frac{m_i}{1 - m_i} \cdot \frac{P_T}{P_M}. \tag{13}$$

## II.2 Labor Markets

The economy is populated with $N$ homogeneous and risk-neutral workers who supply labor inelastically.[6] The wage in the manufacturing sector results from negotiations between unions and firms, whereas the labor market in the traditional sector is atomistic.[7] In the manufacturing sector, each intermediate good producer bargains with a single in-house union in a right-to-manage set up[8] at the beginning of each period. The negotiation partners' stake in the wage bargaining is the difference in payoffs between a situation with and without an agreement. Union $j$ is assumed to

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6 This is because leisure does not enter the utility function $U_i$.

7 This assumption can be justified on the grounds that a) rents only accrue in the monopolistically competitive manufacturing sector and b) unions can appropriate a share of these rents since labor demand is decreasing in wages.

8 In other words, the two negotiation partners jointly determine the wage, while the firm unilaterally sets the employment level afterwards.

represent only firm *j's* production workers. Upon successful completion of the negotiations, union $j$ gains a rent of

$$\Gamma_{U_j} = L_{V_j} \cdot \left(W_{V_j} - Z\right). \tag{14}$$

Firm *j's* stake in the wage bargaining is equal to its variable profits

$$\Gamma_{V_j} = L_{V_j} \cdot \left(P_{V_j} A_j E_j - W_{V_j}\right). \tag{15}$$

Assuming an asymmetric Nash bargaining solution, the wage is set to maximize the geometric average of the negotiation partners' rents from reaching an agreement

$$\Omega_{V_j} = \Gamma_{U_j}^{b_j} \, \Gamma_{V_j}^{1-b_j}, \tag{16}$$

where $b_j$ measures workers' share in the Nash Maximand $\Omega_{V_j}$ and reflects the bargaining power of union $j$. Since firms can choose employment ex-post, the negotiation partners maximize the Nash Maximand by choosing the wage equal to[9]

$$W_{V_j} = q_W Z = \frac{1 + \dfrac{b_j}{s-1}}{1-g_j} \cdot Z \,. \tag{17}$$

The wage is set as a mark-up $q_W$ over the expected outside wage.

After the wage bargaining is completed, all workers in the economy are dismissed and jobs are newly allocated. Members of union $j$ who are not reemployed by firm $j$ expect either to find employment in one of the other *J-1* intermediate good producers at the average manufacturing-sector

9 See Appendix A.

wage $W_V$ or to have to work in the traditional sector at $W_T$. The expected outside wage is, thus, given by

$$Z = prob(N_V|N_V)\cdot W_V + \left(1 - prob(N_V|N_V)\right)\cdot W_T, \tag{18}$$

where $prob(N_V|N_V)$ is the conditional probability that a union member[10] stays in the manufacturing sector.

We model the impact of employment protection on the expected outside wage indirectly by assuming that ex-manufacturing-sector workers have better chances of finding employment in the manufacturing sector than ex-traditional-sector workers,[11] i.e.,

$$prob(N_V|N_V) = y \cdot prob(N_V|N_T), \quad y > 1. \tag{19}$$

Combining (18) with (19) yields[12]

$$Z = \frac{N_V}{N}\frac{y}{1+\frac{N_V}{N}\cdot(y-1)}\cdot W_V + \left(1 - \frac{N_V}{N}\cdot\frac{y}{1+\frac{N_V}{N}\cdot(y-1)}\right)\cdot W_T. \tag{20}$$

## II.3 General Equilibrium

We consider a symmetric equilibrium in which all consumers have identical preferences, and in which union bargaining power, the efficiency wage parameter, the level of technology and the number of

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10 That is, a worker previously employed in the manufacturing sector.

11 We choose to model employment rather than dismissal probabilities because they are easier to handle algebraically. Another factor contributing to the asymmetry between the two groups of workers is sector-specific human capital.

12 See Appendix B.

non-production workers are equal for all intermediate good producers.[13] There are no administrative barriers to market entry for intermediate good producers[14] and the economy is assumed to be closed.

Using these equilibrium conditions and collecting terms, we arrive at[15]

$$w := \frac{W_V}{W_T} = 1 + \frac{\frac{b}{s-1} + g}{1-g} \cdot \left(1 + y \cdot \frac{m}{1-m}\right), \tag{21}$$

$$\frac{h}{1-h} := \frac{N_V}{N_T} = \frac{m}{1-m} \cdot \frac{(1-g)}{\left(1 + \frac{b}{s-1}\right) + \left(\frac{b}{s-1} + g\right) \cdot y \cdot \frac{m}{1-m}}, \tag{22}$$

where $w$ is the relative sectoral wage level and $h$ the employment share of the manufacturing sector.

## II.4 Discussion

The labor market equilibrium depends on the four market imperfections captured by the model parameters $s$, $b$, $g$ and $y$. Absent any market imperfections,[16] manufacturing-sector workers do not receive a sectoral wage premium $(w = 1)$, and the employment share of the manufacturing sector is equal to the budget share spent on good $M$ $(h = m)$.

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13 That is, $m_i = m \ \forall i$, and $b_j = b$, $g_j = g$, $A_j = A$, $F_{V_j} = \frac{F_V}{J} \ \forall j$.

14 Hence, the rents earned by the intermediate good producers just cover their fixed costs, and their profits are zero, too.

15 See Appendix C.

16 That is, $s \to \infty$, $b = 0$, $g = 0$ and $y = 1$.

If we allow for monopolistically competitive intermediate good producers $(1 < s < \infty)$ and union bargaining power $(b > 0)$, we have got a standard wage bargaining model. Firms and unions bargain over the rents earned in the manufacturing sector. The size of the rents is determined by the degree of monopoly power of intermediate good producers. The lower the price elasticity of input demand,[17] $s$, the higher the price mark-up $q_P$ and the rents earned in the manufacturing sector (see (8)). The distribution of the rents between workers and firms depends on the union bargaining power. The higher the share parameter $b$, the higher the proportion of rents going to workers and the higher their wage mark-up $q_W$ (see (17)). Consequently, the sectoral wage premium is decreasing in $s$ and increasing in $b$. It follows from (2), (7) and (13) that higher wages in the manufacturing sector feed into higher prices of, and lower demand for the manufactured good *M*. Therefore, the employment share of the manufacturing sector is increasing in $s$ and decreasing in $b$.

The efficiency wage parameter $g$ enters the model in two ways. If intermediate good producers determine the wage unilaterally $(b = 0)$, the model converges to the standard efficiency model in which wages are set according to the Solow condition.[18] If efficiency wages and union-firm wage bargaining coexist $(0 < b < 1)$, the interaction between the two market imperfections has to be considered, too.[19] First, efficiency wage effects make the variable profits of intermediate good producers less sensitive to wages.[20] This is because effort is increasing in wages so that the costs of

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17 As shown in equation (4), the price elasticity of input demand is equal to the elasticity of substitution between inputs.

18 That is, in equilibrium, wage elasticity of effort, $e_{E,W_v} = g \cdot \frac{W_V}{W_V - Z}$, is unity.

19 For a more detailed discussion refer to Garino and Martin (2000).

20 The wage elasticity of variable profits is $e_{\Gamma_v, W_v} = (1 - s) \cdot (1 - e_{E,W_v})$.

a pay rise are offset by higher output. As a result, intermediate good producers are more willing to make concessions in the wage bargaining. Second, efficiency wages reduce intermediate good producers' wage elasticity of labor demand, thereby, easing the trade-off between wages and employment faced by the unions.[21] Unions, thus, push harder for a pay rise. The stronger the relationship between wage and labor productivity, the stronger are the two efficiency wage effects. Hence, the sectoral wage premium is increasing in $g$ . For the reasons discussed above, the reverse holds true for the employment share of the manufacturing sector.

Finally, the degree of employment protection, $y$ , works through its effect on the disagreement point in the wage bargaining. The higher union members' probability of being reemployed in the manufacturing sector, the higher is, ceteris paribus, their expected outside wage (see (20)) and, thus, the sectoral wage level of the manufacturing sector. Consequently, $w$ is increasing, and $h$ is decreasing in $y$ .

Table 1 summarizes the comparative-static effects of changes in $s$ , $b$ , $g$ and $y$ on the labor market equilibrium. Intersectoral wage differentials and the contraction of manufacturing-sector employment are jointly caused and magnified by all four market imperfections.

Table 1 — Comparative-static Effects of Parameter Changes on the Labor Market Equilibrium

| | $\sigma$ | $\beta$ | $\gamma$ | $\psi$ |
|---|---|---|---|---|
| $\omega$ | - | + | + | + |
| $\eta$ | + | - | - | - |

21 The wage elasticity of union rents is $e_{\Gamma_U, W_V} = \dfrac{W_V}{W_V - Z} + e_{L_V, W_V}$ .

# III Introducing Deregulation and Privatization into the Model

Having characterized the labor market equilibrium, we can now turn to the distributional effects of deregulation and privatization. Following Blanchard and Giavazzi (2001), these policy reforms are integrated into the model in a highly abstract fashion.

By product market deregulation we understand all those policy reforms that increase the degree of competition in the manufacturing sector, such as the reduction of administrative market entry barriers and tougher antitrust enforcement.[22] They are captured in the model by an increase in the absolute value of the elasticity of substitution between inputs, $s$ .

Labor market deregulation has an impact on two model parameters. First, weakening extension agreements and closed-shop arrangements, restricting the right to strike, and other measures to curb union bargaining power are reflected in a reduction of the share parameter $b$. Second, measures to reduce employment protection, such as cutting the legal period of notice, and lowering redundancy payments and other administrative dismissal costs, are modeled by a reduction of parameter $y$ .

Introducing privatization into the model is slightly more complex. First, the impact of privatization on the degree of competition in product markets is ambiguous. On the one hand, Haskel and Szymanski (1993) argue that a shift from public to private ownership changes the objective function of the privatized entity. Public companies are thought to pursue the interests of all stakeholders, i.e., captial owners, consumers and trade unions, while private firms confine themselves to profit maximization. Consequently, private firms should abuse market power to a greater extent than public

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22 In an open economy model, we would also include the reduction of barriers to trade and foreign direct investment.

companies. On the other hand, privatization is often accompanied by product market deregulation. This is done by replacing state monopolies by competitive market structures and by phasing out other types of administrative interference in the market. Furthermore, when balancing the interests of consumers and producers, regulators tend to favor producers in the case of public companies, but consumers in the case of private firms. Hence, antitrust rules tend to be more strictly enforced after privatization. For these reasons, the impact of privatization on $s$ is undetermined.

Second, privatization often goes hand in hand with de-unionization and the weakening of job security. Both union density and co-determination are usually higher in public companies than in private firms. Consequently, privatization can be modeled as a reduction in $b$.[23] Furthermore, public employees frequently enjoy preferential treatment with respect to dismissal protection since a) soft budget constraints in the public sector prevent mass layoffs in the first place, b) the legal rules governing the dismissal of public employees are more stringent, and c) their application is more strictly enforced. Hence, privatization should reduce $y$.

Third, privatization also influences workers' decision to provide effort. While public companies tend to base remuneration and dismissal protection mainly on the principle of seniority, private companies are more likely to use a carrot-and-stick approach. On the one hand, they offer performance related pay and fast-track careers for high achievers. On the other hand, they use close monitoring to prevent shirking.[24] Privatization should, thus, strengthen the relationship between wage and labor productivity. In other words, $g$ should increase.

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23 See, for example, Haskel and Sanchis (1995).

24 See Goerke (1998).

The impacts of deregulation and privatization on the degree of market imperfections in product and labor markets and on the labor market equilibrium are summed up in Table 2. In the case of product and labor market deregulation, the distributional effects are clear cut. Deregulation reduces the sectoral wage premium and expands manufacturing-sector employment either via an increase of product market competition or via a decrease of union bargaining power and employment protection. In the case of privatization, however, the distribution effects are ambiguous. First, the impact of privatization on the degree of product market competition is undetermined. Second, the fall in union bargaining power and employment protection is offset by the rise in the efficiency wage parameter. As a result, depending on the strength of the various partial effects, the sectoral wage premium and the employment share of the manufacturing sector either grow or decline.

Table 2 — Impact of Deregulation and Privatization on Product and Labor Markets

| | Deregulation of Product Markets | Deregulation of Labor Markets | Privatization |
|---|---|---|---|
| $\sigma$ | + | | ? |
| $\beta$ | | - | - |
| $\gamma$ | | | + |
| $\psi$ | | - | - |
| $\omega$ | - | - | ? |
| $\eta$ | + | + | ? |

## IV Conclusions

In this paper, we developed a simple general equilibrium model of a dual economy with monopolistically competitive firms, union-firm wage bargaining, employment protection and efficiency wages, and applied it to discuss the distributional effects of a wide range of policy reforms. The model predicts that in the case of product and labor market deregulation, workers in the manufacturing sector lose in wages relative to workers in the traditional sector. In the case of privatization, however, they may either gain or lose. Since workers in the manufacturing sector tend to be relatively well-organized, political pressure is more likely to mount against deregulation than against privatization. This result offers a possible explanation of why many countries have made considerable progress in privatizing public companies but have got stuck with their product and labor market reforms.

# Appendix A

The negotiation partners solve the following program

$$\begin{aligned}
&\max_{\{W_{V_j}\}} \Omega_{V_j} = \Gamma_{U_j}^{b_j}\,\Gamma_{V_j}^{1-b_j}, \\
\text{s.t.}\quad &\Gamma_{U_j} = L_{V_j}\cdot\left(W_{V_j} - Z\right), \\
&\Gamma_{V_j} = L_{V_j}\cdot\left(P_{V_j}\,A_j E_j - W_{V_j}\right).
\end{aligned} \tag{A1}$$

The first order condition for the optimal wage reads

$$e_{\Gamma_{U_j},W_{V_j}} = -\frac{1-b_j}{b_j}\cdot e_{\Gamma_{V_j},W_{V_j}} \tag{A2}$$

with

$$e_{\Gamma_{U_j},W_{V_j}} = \frac{W_{V_j}}{W_{V_j}-Z} - s + (s-1)\cdot g_j\cdot\frac{W_{V_j}}{W_{V_j}-Z}, \tag{A3}$$

$$e_{\Gamma_{V_j},W_{V_j}} = (1-s)\cdot\left(1 - g_j\cdot\frac{W_{V_j}}{W_{V_j}-Z}\right) \tag{A4}$$

being the wage elasticities of the unions' and the firms' stake in the negotiations. Substituting (A3) and (A4) into (A2), we obtain

$$W_{V_j} = q_W Z = \frac{1+\dfrac{b_j}{s-1}}{1-g_j}\cdot Z. \tag{17}$$

# Appendix B

In equilibrium, the number of manufacturing-sector jobs is equal to the number of job applicants from both sectors weighted by their respective employment probabilities, i.e.,

$$N_V = N_V \cdot prob(N_V | N_V) + (N - N_V) \cdot prob(N_V | N_T). \tag{B1}$$

Inserting (19) into (B1) yields

$$prob(N_V | N_V) = \frac{N_V}{N} \cdot \frac{y}{1 + \frac{N_V}{N} \cdot (y - 1)}. \tag{B2}$$

Using (B2), equation (18) may be written as

$$Z = \frac{N_V}{N} \frac{y}{1 + \frac{N_V}{N} \cdot (y - 1)} \cdot W_V + \left( 1 - \frac{N_V}{N} \cdot \frac{y}{1 + \frac{N_V}{N} \cdot (y - 1)} \right) \cdot W_T . \tag{20}$$

# Appendix C

It is straightforward to show that in a symmetric equilibrium, wage $W_{V_j}$, price $P_{V_j}$, demand $V_j$ and labor demand $L_{V_j}$ are equal for all intermediate good producers.

Using these results, we obtain the implicit labor demand function of the manufacturing sector

$$\frac{W_V}{P_V} = \frac{s-1}{s} \cdot AE \tag{C1}$$

from equation (7), and the implicit labor supply function of the manufacturing sector

$$\frac{W_V}{P_V} = \frac{\left(1+\frac{b}{s-1}\right)}{1-g-\frac{N_V}{N-N_V}\cdot\left(\frac{b}{s-1}+g\right)\cdot y} \cdot \frac{P_T}{P_V} \tag{C2}$$

by inserting (19) into (20).

Combining (C1) and (C2), it is possible to derive the relative supply of the manufactured good

$$\frac{M}{T} = \frac{(1-g)\cdot\frac{s-1}{s}\cdot AE - \left(1+\frac{b}{s-1}\right)\cdot\frac{P_T}{P_V}}{\left(\frac{b}{s-1}+g\right)\cdot y}.$$

Inserting (C3) into (13) yields the relative price of the manufactured good

$$j := \frac{P_V}{P_T} = \frac{1+\frac{b}{s-1}+\frac{m}{1-m}\cdot\left(\frac{b}{s-1}+g\right)\cdot y}{(1-g)\cdot\frac{s-1}{s}\cdot AE}. \tag{C4}$$

Substituting (C4) and (11) into (C1), we arrive at

$$\boldsymbol{w} := \frac{W_V}{W_T} = 1 + \frac{\frac{\boldsymbol{b}}{\boldsymbol{s}-1} + \boldsymbol{g}}{1-\boldsymbol{g}} \cdot \left(1 + \boldsymbol{y} \cdot \frac{\boldsymbol{m}}{1-\boldsymbol{m}}\right). \tag{21}$$

Given equation (C4), it is also straightforward to solve for

$$\frac{\boldsymbol{h}}{1-\boldsymbol{h}} := \frac{N_V}{N_T} = \frac{\boldsymbol{m}}{1-\boldsymbol{m}} \cdot \frac{(1-\boldsymbol{g})}{\left(1 + \frac{\boldsymbol{b}}{\boldsymbol{s}-1}\right) + \left(\frac{\boldsymbol{b}}{\boldsymbol{s}-1} + \boldsymbol{g}\right) \cdot \boldsymbol{y} \cdot \frac{\boldsymbol{m}}{1-\boldsymbol{m}}}. \tag{22}$$

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