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Decentralized Pollution Standard Setting with Agglomeration Forces Present in a Model of Specific Firm Mobility

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Abstract

Herein we augment the traditional devolved environmental interjurisdictional-competition model with specific firm mobility in the presence of agglomeration economies. Now the number of firms in a jurisdiction becomes pertinent in the story of decentralized efficiency. Specifically, when agglomeration forces are sufficiently strong, firm movement is subdued. Placed-based environmental policies aimed at swaying a firm's location decision are rendered relatively ineffective. As a result, jurisdictions possess incentives to excessively overprotect environmental quality − a race-to-the-top. Firm taxation effects on devolved efficiency are also examined.

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1. Introduction

The dissemination of economic activity varies markedly across any given nation. Location choices made by firms play a key role in shaping this diverse economic landscape. Recognizing this, local authorities shape place-based policies that aim to attract firms to their jurisdiction. While many of these local policies are fiscal in nature (e.g. taxation), environmental standards also surface as a key placed-based policy lever. Of course, many nations preserve a federal governance system, yet the allocation of authority across the many levels of government in that system remains an important and unresolved issue. Whether environmental standards are best set centrally or locally has been a debated topic for decades. This quest for optimal allocation of environmental authority across multiple layers of government is generally coined, environmental federalism (Oates 2002). At the center of the environmental federalism debate is whether devolved environmental decision making is welfare enhancing or leads to a race-to-the-bottom outcome.

While it is intuitively understandable that polluting firms would locate where environmental regulations are lax, the empirical evidence of a more broad race-to-the-bottom[2] result is not convincing.[3] If residents of a community presumably care about environmental quality, then using that quality as a policy lever imposes real costs on locals. The empirical evidence just referenced may be reflecting that interjurisdictional competition has not yet reached predicted "destructive" levels (Cumberland 1981). Interestingly, the early empirical studies[4] on the impacts of decentralized environmental regulations on specific firm location choices all sang verses from the same tune, "differences in environmental regulations do not systematically affect the location choices…" (Levinson 1996, p. 5) and "results indicate the overwhelming importance of existing business activity as an attractive factor…" (Mani et al 1997, p. 17). Many of the empirical studies referenced found agglomeration economies more important to firm location decisions than environmental regulatory stringency.

Going back as far as Chipman (1970), technological externalities have been forefront in theoretical models looking at city formation. The new economic geography (NEG) literature, following Krugman (1991) and Baldwin and Krugman (2004), stressed the importance of agglomeration forces in models that analyzed production differences across regions. Within the standard devolved tax competition literature, agglomeration impacts have mostly been ignored with few exceptions.[5] The same can be said regarding the theoretical environmental federalism literature.[6] One exception, Kunce (2022a), models mobile capital-

[2] Also known as the 'pollution haven effect' in international settings. See Zeng and Zhao (2009) for a thoughtful review of this literature.

[3] See Millimet (2014), Chang and Chu (2021) and Woods (2021) for extensive reviews.

[4] Most noteworthy, Bartik (1988), McConnell and Schwab (1990), Levinson (1996) and Mani et al (1997).

[5] See Garcia-Milà and McGuire (2001), Fernández (2005) and Krogstrup (2008).

[6] Specific examples involving a decentralized setting are scant. See Pang et al (2021) for a related review.

inputs' response to capital taxation, local emission standards and varying intensities of external economies. Kunce finds when agglomeration forces are weak to moderate, jurisdictions possess incentives to under-provide local public goods and relax environmental standards in order to attract capital inputs. In contrast, when agglomeration forces are sufficiently strong, jurisdictions choose more stringent environmental regulation, compared to the social optimum, not fearing capital flight. The fixity of firms is implicitly assumed in the Kunce (2022a) model. Some economists argue that examining whether firms locate optimally, in a decentralized setting, is difficult to achieve by simply over-generalizing capital mobility (Wellisch 1995, Matsumoto 1998). When jurisdictions allow firms to pollute, in varying forms and degrees, resulting production enhancements and/or abatement cost savings are viewed as 'rents' that mobile firms desire. Richter (1994) and Richter and Wellisch (1996) suggested that firm mobility must be considered in the devolved traditional model and that mobile firms will locate where rents are the highest. The goal herein is to augment the traditional devolved environmental competition model with specific firm mobility in the presence of agglomeration economies. Now the number of firms in a jurisdiction becomes pertinent in the story of decentralized efficiency. We determine the number of firms in a jurisdiction endogenously by allowing a nationally fixed number of firms to chase emission rents and provide all residents of the nation equal ownership shares of these mobile firms. Agglomeration economies are introduced through external increasing returns to scale as firms accumulate, generally following the approach of Fernández (2005). Individual firms operate under constant-returns-to-scale and the accumulation of firms in a jurisdiction has productivity effects on all firms in that jurisdiction. Individual firms view the accumulation of firms as parametric though local authorities recognize the increased productivity due to scale economies and take this effect into account when maximizing the utility of local residents. Section 2 presents the augmented model and the socially efficient benchmark. Section 3 presents a comparison of outcomes from the traditional model to the agglomeration augmented construct. In section 4 we introduce a firm tax and explore its' impact on devolved efficiency. Lastly, section 5 concludes with a historical thought.

2. The augmented model with specific firm mobility

The model is grounded by the work of Oates and Schwab (1988), Wellisch (1995), Fernández (2005) and Kunce (2022a). A national economy consists of a large number of identical, small jurisdictions (indexed $j = 1, \dots, J$) where agglomeration forces are present. The assumption of identical jurisdictions avoids the introduction of Tiebout (1956) type inefficiencies. If local inefficiencies arise in an identical setting, they are likely exacerbated in a heterogeneous model. Smallness presumes a competitive interjurisdictional model.[7] In each jurisdiction there is a single

[7] See Kunce and Shogren (2002) and Kunce (2022b) for models more in the spirit of imperfect competition.

industry producing a numeraire good comprised of homogeneous, competitive, perfectly mobile, polluting firms, N_j, where,

$$\overline{N} = \sum_{j=1}^{J} N_j \ . \tag{1}$$

The total number of firms in the economy, $\overline{N}$, is determined exogenously which excludes firm formation and market entry complexities from the model. Identical residents of the nation own equal and severable shares of $\overline{N}$. We treat N_j as if it were a continuous variable − firms emit pollution only in the jurisdiction where they locate and take their emissions with them upon migration.[8] Firms are said to be identical if they use the same technology represented by the production function,

$$f(l, e), \tag{2}$$

where l denotes a single firm's employment of the jurisdiction's fixed factors of production, $l = L_j \,/\, N_j$ (e.g. labor, capital and land), and e represents the firm's pollution emissions, $N_j e = E_j$ in the aggregate. The fixed factors are inelastically and equally supplied to firms locating within a jurisdiction and are owned entirely by the representative resident of a jurisdiction.[9] The environmental authority in each jurisdiction sets an allowable, E_j , for firms that locate within its boundaries. Following Oates and Schwab (1988), allowed (capped) emissions for a firm are included in the constant-returns-to-scale (CRS) technology and treated as if they were public inputs of the 'unpaid' type (Feehan 1989). Presuming linear homogeneity, production for the jurisdiction becomes,

$$N_j f(l, e) = f(N_j l,\ N_j e) = F(L_j, E_j) = F = F_L L + F_E E\,, \tag{3}$$

where subscripts on the far right-hand-side (RHS) denote partial derivatives. Higher levels of E_j correspond to relaxed environmental standards for a jurisdiction. To simplify the exposition, jurisdictional subscripts will be suppressed going forward, with few exceptions. Standard neo-classical curvature properties require $F_L, F_E > 0,\ \ F_{LL}, F_{EE} < 0$, and Euler's theorem forces $F_{LE}, F_{EL} > 0$.[10] Akin to Fernández (2005), agglomeration economies will augment jurisdictional production as external forces deriving from the total number of firms within a jurisdiction. The function $A(N)$ represents external scale economies of firms accumulating in a

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[8] This type of externality fits Oates's (2002) "benchmark case 2" where emissions have mainly jurisdictional effects. This case is the strongest candidate for analysis regarding decentralized standard setting.

[9] Residents of the nation are identical in everyway, therefore we normalize the fixed population of a specific jurisdiction to one.

[10] Young's theorem shows the two cross-partials are equal.

specific jurisdiction. Individual firms regard $A(N)$ as parametric. Multiplicative augmented jurisdictional production becomes,

$$F(L,E)A(N) = FA = \left(F_L L + F_E E\right)A = AF_L L + AF_E E\,, \tag{4}$$

where generally $A(N) > 1$ and $A_N > 0$. Integral to equation (4), firms produce under CRS yet an increase in the number of firms in the jurisdiction has productivity effects on *all* firms within the jurisdiction. Pollution emissions generate output contributions, shown in equation (4) as $AF_E E$ or $\frac{1}{N} AF_E E$ per firm. Output contributions in this context could be though of as reduced compliance costs. In equilibrium, this output contribution (rent) must clear. Following Wellisch (1995), competitive firms seek this rent and will locate where they can maximize it,

$$\pi\, N = AF_E E\,, \tag{5}$$

where a firm location equilibrium is achieved when rents per firm, π, are equalized across all jurisdictions. Jurisdictional authorities and firms treat π as parametric.
Firms in a jurisdiction then employ local fixed factors and pay an endogenously determined return, $r = AF_L$, to the representative resident owner,

$$rL = FA - \pi\, N\,. \tag{6}$$

For simplicity and without loss of generality, we have not modeled a complete public sector.[11] Instead, we assume that jurisdictions finance non-environmental public goods with non-distorting fixed factor taxation and tax revenues are simply returned to the representative resident. For example, assume a Samuelsonian public good is defined as, $G = tL$, where t is a free to vary lump-sum tax on the fixed factors. Taxing the fixed factors in this manner ensures efficiency in local public good (non-environmental) provision (Kunce 2000). By redistributing G back to the representative resident, the local fixed factor return is equivalent to what is found in equation (6). Thus, the focus herein is on isolating potential distortions of devolved environmental standard setting.
As previously stated, each symmetric jurisdiction has a normalized representative resident identical in preferences and solely owns the local fixed factors. A jurisdictional resident's total income consists of net returns to the fixed factors and any *exogenous* income, y, that includes any returns from firm ownership. Using equation (6), jurisdictional income-consumption is equal to,

$$C = FA - \pi\, N + y\,. \tag{7}$$

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[11] See Kunce (2022c) for a model with agglomeration that includes a more complete public sector, though specific firm mobility is not addressed.

The resident of a jurisdiction receives utility from consumption, but suffers disutility from the level of allowed pollution emissions. Quasi-concave jurisdictional utility takes the form, $U(C,E)$, where $U_C > 0$, but $U_E < 0$. Higher E corresponds to poorer environmental quality where E represents a pure public bad. In keeping with the Arrow-Debreu (Wilson 1999) separation assumption for general equilibrium constructs, residents have two distinct roles in the model. First, as consumers, they seek to maximize utility over a bundle of consumption goods. Second, supplying fixed factor inputs to production and in return receiving income for consumption. More firms enhance local production and can provide residents with higher incomes hence more consumption. However, in order to attract firms, the jurisdiction relaxes environmental regulations (lowering utility directly) thus setting up a characteristic economic tradeoff.

Benchmark social efficiency requires the maximization of the jurisdictional utility subject to (i) utility in all other jurisdictions is equalized to a fixed level, (ii) aggregate production and consumption clear, and (iii) mobile firms are allocated entirely among jurisdictions. The resulting social optimum conditions from the *standard* model are well known (see Oates and Schwab 1988) therefore derivation discussion here is keep to a minimum. Social efficiency becomes,

$$\frac{-U_E}{U_C} = F_E \quad \forall \text{ jurisdictions}, \tag{8}$$

$$F_E^i = F_E^j \quad \forall i, j \;\; i \neq j \,. \tag{9}$$

Equation (8) shows that jurisdictions should choose a combination of environmental quality and consumption such that the marginal rate of substitution between the two equals the marginal product of emissions (recall that $U_E < 0$).[12] Equation (8) then represents a Samuelson rule for environmental quality (Kunce and Shogren 2005a). Equation (9) depicts the optimal clearing condition for mobile firms.

Jurisdictional authorities, taking into account the presence of external economies, choose firm emission allowances, E in aggregate, that maximizes the representative resident's utility subject to equation (7). Unlike firms, the local authority recognizes that more firms enhance productivity through agglomeration and take this effect into account when maximizing jurisdictional utility. The first order condition becomes,

$$\frac{U_E}{U_C}\frac{\partial E}{\partial E} + \frac{\partial C}{\partial E} = 0\,, \tag{10}$$

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[12] Herein, consider a production function with a scalar constant, $\overline{A}F(L,E)$. The marginal product with respect to emissions becomes $\overline{A}F_E(L,E) = \overline{A}F_E$. Recall firms view $A(N)$ as parametric.

and when using equation (7),

$$\frac{\partial C}{\partial E} = FA_N \frac{\partial N}{\partial E} + AF_E \frac{\partial E}{\partial E} - \pi \frac{\partial N}{\partial E}. \qquad (11)$$

Combining equations (5), (10) and (11) yields,

$$\frac{-U_E}{U_C} = AF_E + \left(FA_N - \pi\right)\frac{\partial N}{\partial E} = AF_E + \left(FA_N - \frac{AF_E E}{N}\right)\frac{\partial N}{\partial E}. \qquad (12)$$

The term on the far RHS of equation (12) represents the *wedge* between decentralized and social environmental efficiency (see equation (8) and footnote 12). If this *wedge* term is positive (negative) jurisdictions set allowed pollution emissions higher (lower) than the social optimum. The sign of the *wedge* parenthesis term is clearly ambiguous and depends on agglomeration productivity effects, production relationships and magnitudes. One key relationship involves the extent to which external economies change with the addition of firms, A_N, at the margin. For example, if agglomeration forces are sufficiently weak (very small A_N) the sign of this term could easily be negative. As external economies strengthen, ceteris paribus, this term likely turns positive. How firms respond to changes in allowed emissions is the second component vital to establishing the sign of the *wedge* term. Equation (5) provides the optimal clearing condition necessary to derive $\partial N / \partial E$ using the implicit function theorem where,

$$I_1 : \frac{AF_E E}{N} - \pi = 0,$$

$$\frac{\partial N}{\partial E} = -\frac{\partial I_1 / \partial E}{\partial I_1 / \partial N} = -\frac{\dfrac{NA(F_E + EF_{EE})}{N^2}}{\dfrac{N(F_E EA_N) - AF_E E}{N^2}} = \frac{NA(F_E + EF_{EE})}{F_E E(A - NA_N)}. \qquad (13)$$

The sign of the far RHS numerator depends on the term in parenthesis. This term reflects how emission rents, $F_E E$, change with allowed emission levels. A natural assumption suggests that rents increase with increases in allowed emissions. As stated above, rents increase when compliance costs are reduced. The sign of the denominator depends on the magnitude of marginal external productivity, A_N, found in the parenthesis term. If agglomeration forces are sufficiently weak, this term will be positive. Relatively strong external economies will likely drive this term negative.

Proposition 1. *How firms respond to local environmental standards depends on how emission rents change with allowed emissions and the influence of agglomeration forces. Rents increasing when jurisdictions allow more emissions follows a natural assumption. When agglomeration forces are sufficiently weak, firms favor locations with lax standards hence higher rents,* $\partial N/\partial E > 0$ *. As external economies become more influential, firms are not swayed by jurisdictions with lax standards,* $\partial N/\partial E < 0$.

Although many cases may determine the sign and magnitude of the *wedge* shown in equation (12), the polar cases of agglomeration strength are most noteworthy. Relatively weak agglomeration influence essentially turns the model into one similar to Wellisch (1995). Small A_N drives the *wedge* parenthesis term negative and $\partial N/\partial E > 0$, leaving the overall *wedge* signed negative. From equation (12), the social benefit from improving the environment, $-U_E/U_C$, is now less than the social cost, AF_E, therefore emission allowances will be lowered. This equilibrium is akin to Wellisch's (1995) environmental overprotection result. Small agglomeration impacts allow pollution rents to dominate the *wedge* parenthesis term and firms respond by locating where these rents are the highest. Moreover, rents go to firms that are mostly owned by residents outside the jurisdiction, therefore, locals bear the entire burden of the externality with little offsetting benefit. Stricter environmental standards are the Wellisch result.

As agglomeration forces become more dominate, the *wedge* remains negative but from different influences. As sufficiently large marginal external productivity, FA_N , now dominate rents in the *wedge* parenthesis term − how firms respond to local environmental policy also reverses sign. Strong agglomeration forces result in firms not being swayed to locate to jurisdictions with relaxed emission standards. Firm mobility is hindered giving local authorities incentive to reduce allowed emissions below the social optimum. Chasing emission rents loses importance when agglomeration impacts are strong. This equilibrium is somewhat comparable to Kunce's (2022a) proposition 3, though his model focuses on the mobile capital production input and not explicitly mobile firms.

Proposition 2. *Strong agglomeration forces tend to subordinate emission rent influence on firms. When external economies to scale are strong at the margin, jurisdictions lose influence to attract firms with lax environmental standards. As a result, jurisdictions now possess incentives to strengthen environmental protection without fear of firms relocating.*

3. A comparison to the standard model

By introducing a new externality into the standard decentralized framework focusing on firm mobility, a comparison of the two outcomes is warranted.[13] In the case of no agglomeration effects, $A(N)$ becomes $\overline{A}$, implying $A_N = 0$. The optimality condition of the more traditional model becomes,

$$\frac{-U_E}{U_C} = \overline{A}F_E - \overline{A}(F_E + EF_{EE}). \tag{14}$$

As long as emission rents increase with allowed emission levels, jurisdictions will set stricter standards. For comparison, a suitable rearrangement of the *wedge* term in equation (12) with (13) yields,

$$\frac{-U_E}{U_C} = AF_E - \frac{A(F_E + EF_{EE})(AF_E E - NFA_N)}{F_E E(A - NA_N)}. \tag{15}$$

Obviously, as A_N approaches zero, equation (15) converges to equation (14). As long as agglomeration forces are weak at the margin, the augmented model suggests local standard setting similar to the traditional framework. Though being a target difficult to hit, efficiency could be achieved if the numerator of the far RHS of equation (15) is zero. Lastly, as A_N becomes sufficiently large, marginal external productivity will dominate and jurisdictions will overprotect far beyond the equilibrium in the standard model. Figure 1 illustrates the impact of a rising A_N on the rearranged *wedge* term in equation (15).

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[13] Examples of the more traditional model include Wellisch (1995), Kunce and Shogren (2005a) and Kunce and Shogren (2005b).

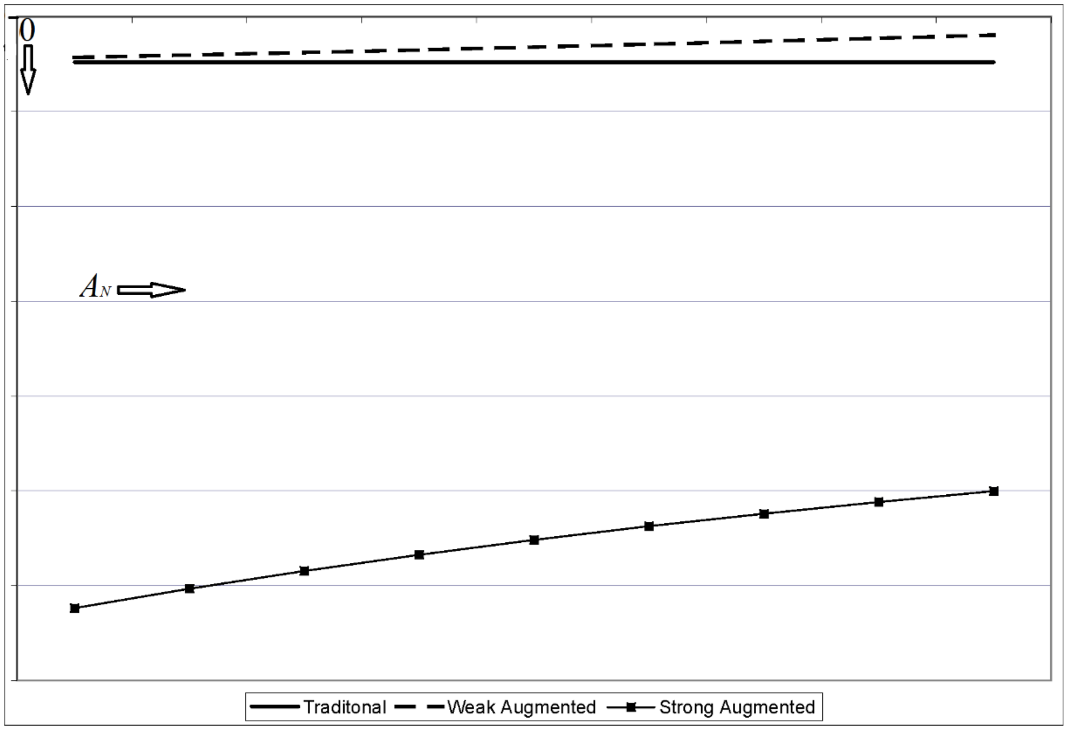

Figure 1: Wedge graph

In order to see a clearer picture, it is useful to consider a specific numerically simulated case. Note that the implications of the far RHS of equation (15) can be captured by focusing on production alone. To reiterate, the terms to the right of AF_E in equations (14) and (15) represent the wedge between decentralized and social environmental efficiency. If this wedge is positive (negative), jurisdictions set allowed emissions higher (lower) than the social optimum. The impacts of varying A_N can be simulated using a CRS Cobb-Douglas production function of the basic form, $A\overline{F} = A(L^{(3/4)}E^{(1/4)})$, where the output quantity is fixed (recall A is parametric in the firms' view). Moreover, fixed input levels and exponents avoid any efficiency distortions stemming from input intensities. As shown in figure 1, A_N rises moving left to right horizontally. The value of the *wedge* term is depicted on the vertical axis starting at zero from the top and becoming more negative when moving downward. Note that general movement and magnitudes are centerpiece in figure 1 − we disregard raw numerical results because the simulated values are relatively meaningless in this context. The dashed line depicts weak agglomeration forces rising from zero. Weak external economies somewhat map the traditional overprotection equilibrium. Strong agglomeration impacts are shown on the same graph with A_N rising from a much higher starting level. Strong external economies are shown to exacerbate the negative *wedge* and compound overprotection incentives.

Proposition 3. *In the standard model, assuming efficient provision of non-environmental public goods, firms chasing dominant emission rents creates an externality that provides jurisdictional authorities incentive to overprotect the environment. Augmenting the model with sufficiently strong agglomeration forces intensifies the overprotection result but from different influences. Strong external productivity effects now dominate and firms become 'sticky' allowing jurisdictions to heighten overprotection without fear of firm flight.*

4. Firm taxation

First presume that local jurisdictions have the authority to tax firms.[14] Firm taxation may provide a remedy to realign the devolved results derived above with social efficiency. A simple firm tax, *T*, is easily integrated into equation (5) yielding,

$$\pi N = AF_E E - NT\,. \tag{16}$$

The representative resident's consumption constraint remains unchanged from what is shown in equation (7). Firm taxation revenue is returned to the representative resident much like the revenues from the fixed factor tax above. Now the local authority maximizes the representative resident's utility, subject to equation (7), by choosing $\theta = \{E, T\}$. First order conditions become,

$$\frac{U_E}{U_C}\frac{\partial E}{\partial \theta} + \frac{\partial C}{\partial \theta} = 0\,, \tag{17}$$

and when using equation (7),

$$\frac{\partial C}{\partial \theta} = FA_N \frac{\partial N}{\partial \theta} + AF_E \frac{\partial E}{\partial \theta} - \pi \frac{\partial N}{\partial \theta}\,. \tag{18}$$

Combining equations (16), (17) and (18) yields the optimal conditions,

$$\frac{-U_E}{U_C}\frac{\partial E}{\partial \theta} = AF_E \frac{\partial E}{\partial \theta} + \left(FA_N - \left(\frac{AF_E E}{N} - T \right) \right) \frac{\partial N}{\partial \theta}\,, \tag{19}$$

that become for each choice variable,

$$E:\;\; \frac{-U_E}{U_C} = AF_E + \left(FA_N - \left(\frac{AF_E E}{N} - T \right) \right) \frac{\partial N}{\partial E}\,, \tag{20}$$

[14] For example, in the U.S., this authority would be held, generally, at the state-level.

$$T:\ 0=\left(FA_N-\left(\frac{AF_E E}{N}-T\right)\right)\frac{\partial N}{\partial T}. \tag{21}$$

How firms respond to emission standards, $\partial N/\partial E$, is found in equation (13). How firms respond to changes in the firm tax must be derived,

$$I_2:\frac{AF_E E}{N}-T-\pi=0,$$

$$\frac{\partial N}{\partial T}=-\frac{\partial I_2/\partial T}{\partial I_2/\partial N}=-\frac{-1}{\frac{N(F_E EA_N)-AF_E E}{N^2}}=\frac{-N^2}{F_E E(A-NA_N)}. \tag{22}$$

From equation (22), when agglomeration forces are sufficiently weak, firms are repelled from jurisdictions with higher taxation. Interestingly, when agglomeration forces are strong at the margin, firms are not deterred by higher taxes. Solving equations (20) and (21) simultaneously, using equations (13) and (22), yields the optimal conditions,

$$\frac{-U_E}{U_C}=AF_E, \tag{23}$$

$$T=-\left(FA_N-\frac{AF_E E}{N}\right). \tag{24}$$

Equation (23) shows that devolved emission standards are set to the socially optimal level. Regardless of agglomeration magnitudes at the margin, jurisdictions refrain from using environmental standards to sway firms. Focusing on equation (24), *T* is equivalent to the negative of the *wedge* parenthesis term found in equation (12). When agglomeration forces are weak, the firm tax captures positive rents in a rather Pigovian (1932) manner. However, when agglomeration forces are strong and dominate, jurisdictions possess incentives to subsidize (negative *T*) firms. Production enhancement from agglomeration now dominates the rent effect and firm tax revenues returned to the representative resident carry little weight in equilibrium.

5. Concluding remarks

Agglomeration economies are a seminal contribution from the regional economics and NEG literatures. Economic integration has been found to me a major force behind the spatial distribution of economic activity across all landscapes. Surprisingly, agglomeration impacts have been somewhat ignored in devolved interjurisdicitonal modeling. This is in spite of early firm location empirical work bolstering agglomeration impacts over other place-based policies including environmental regulation. This paper has demonstrated the importance of including economic integration in devolved firm location models. Specifically, when agglomeration forces are sufficiently strong, firm movement is subdued. Placed-based policies aimed at swaying a firm's location decision are rendered relatively ineffective. Regarding decentralized environmental regulation, the Wellisch (1995) overprotection result is exacerbated under strong agglomeration forces. This conclusion is somewhat akin to Baldwin and Krugman's (2004) fiscal race-to-the-top result. The NEG literature points out that relatively strong agglomeration forces essentially lock mobile factors to a geographical location resulting in a core-periphery equilibrium. Correspondingly, placed-based policies will not likely induced mobile factor flight.

The empirical evidence cited in the introduction suggests that the devolution of regulatory authority does not necessarily lead to a reduction of environmental quality. The lack of convincing support, empirically, for an environmental race-to-the-bottom suggests that other forces are perhaps more important to the location of economic activity. Interestingly, agglomeration economies have rarely been considered in the devolved environmental policy theoretical literature. This disconnect is astonishing. Even Alfred Marshal (1890, p. 225) got it right over 130 years ago,

> "When an industry has thus chosen a location for itself, it is likely to stay there long: so great are the advantages which people following the same skilled trade get from near neighborhood to one another. The mysteries of the trade become no mysteries; but are as it were in the air..."

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