Trade costs and the timing of competition policy adoption[*]

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Abstract

This paper first presents stylised evidence showing how the date of the adoption of competition policy is correlated with country size. Smaller countries tend to adopt competition policy later. We then present a theoretical model with countries of different size, trade costs and firms competing à la Cournot. In the model we show that reduced trade costs following from increasing globalisation affect countries differently depending on their size. This has implications for the incentives to introduce competition policy. The predictions of the model are consistent with the empirical regularity presented.

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1 Introduction

Competition policy is by now prevalent and important in most industrialised countries, and is being adopted in developing countries and in recent market economies (see Basedow, 2004). An interesting example is China, which after long deliberation recently adopted a new Anti-Monopoly Law coming into effect on August 1, 2008 (see also Mason and Jiangxiao Hou, 2004). However, anti-trust legislation has been introduced at very different points in time. The United States passed its first anti-trust law as early as 1890, and other countries followed during the 20th century, but with significant lags. For instance, the first British competition law was passed

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in 1948 (although was not enforceable until 1956), and France and Germany followed in 1953 and 1957 (see Neumann, 2001). Several countries, like Italy, New Zealand and Switzerland, did not adopt national competition laws until the 1980s and 1990s.

The advantages of competition have long been well-established, which makes it surprising that countries at roughly the same level of industrial development have introduced national anti-trust regulations at very different points in time. Scherer (1997) suggests that a factor explaining reluctance to introduce competition policy may have been "...the belief that only large, monopolistic firms can compete effectively with overseas rivals..." (page 12). This view thus suggests that countries introduce competition policy when they realise that such a belief is incorrect.

We propose instead that many (European and other) countries at earlier points in time found it in their own interest to wait with introducing a national competition policy, and that their subsequent decision to adopt competition policy mainly results from changing economic conditions. In this paper we investigate the hypothesis that the differences in timing may derive from the simple fact that countries differ in size, and that they are therefore affected in different ways by the increased international trade that follows from reduced trade costs. The paper presents a simple Cournot model showing how globalisation will induce countries of different size to introduce competition policy at different levels of trade costs. The predictions of the model are consistent with stylised facts presented.

In addition to Scherer (1997), a few studies have looked into the institutional and empirical aspects of country differences in competition policy. Boner and Krueger (1991) study the application of competition policy in ten countries plus the European Economic Community. In addition to efficiency goals, they suggest economic development, which increases the weight on consumer interest and social goals as well as country size, as driving forces behind the trend towards more and stricter competition policy. Some of the hypotheses are tested by Clougherty (2005), who considers the merger policies of 27 countries in the period 1992-2000 and examines how trade balance, GDP, population, and deregulation explain country differences. The conclusion is that countries with stricter merger policies are countries with higher wealth,

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smaller populations and more deregulation, and that net exporting countries tend to use merger policies leniently. Building on Palim (1998), Kronthaler and Stephan (2007) study 164 countries for the years 1980-2004, using as dependent variable whether a country has a competition policy or not. They identify a number of factors, among them wealth, country size, economic freedom, import competition, foreign direct investment and level of industrialisation, that incraese the probability that a country introduces a competition policy.

In line with these studies we also consider different factors that could explain a country's decision to adopt a competition policy, and in many cases the same factors. However, as our dependent variable we use the year of introduction of policy, thus focusing explicitly on timing. We limit our empirical analysis to a smaller number of countries since we aim to compare countries at roughly similar levels of industrial development.

There are several theoretical studies on different aspects of competition policy in open economies. When studying the welfare effects of competition policy and international trade, the strategic effects of changes in the numbers of domestic and foreign firms in home country and foreign markets are crucial. Thus, an oligopolistic framework seems appropriate when investigating these effects. This type of analysis was first introduced by Dixit (1984) who examines both trade policies, like tariffs and export subsidies, and competition policy within a Cournot framework. One question addressed is whether foreign competition might make domestic competition policy redundant, perhaps to the extent of increasing the benefits of domestic mergers.[1]

One strand of the theoretical literature focuses on the implications of a national policy perspective in comparison with a supranational one. Barros and Cabral (1994) extend the merger policy analysis of Farrell and Shapiro (1990) by discussing optimal merger policies for an open economy, assuming homogenous products and Cournot competition. Starting from the observation that in open economies competition authorities ignore the effects of domestic mergers on foreign firms and consumers, it is shown that conditions under which a merger is welfare-improving nationally, may be more or less strict than if a supra-national welfare standard is applied. Head and Ries (1997) examine the relationship between national and supra-national

merger regulations in a Cournot framework with focus on the importance of relative firm and country size. They conclude that in the absence of cost savings it will often be in the national interest of competition authorities also of small countries to block mergers that reduce global welfare. This will not be the case however when the merger is associated with substantial cost savings.

Other researchers focus on the stategic effects of competition policy. Sørgard (1997) shows that a merger without cost savings may increase welfare if the country is a net exporter of the good. Hollis and Yuan (2004) demonstrate that competition policies can be used strategically and that country size will be a factor determining this. Clougherty and Zhang (2005) investigate the interaction of export orientation with optimal domestic merger policy under the assumption that mergers do not involve cost synergies. In this case, a more stringent domestic merger policy should be applied in exporting sectors. They find support for this hypothesis in US merger policy data.

Closest in line with our study is perhaps Horn and Levinsohn (2001) who discuss the connection between trade costs, as measured by trade *policy,* and competition policy in the form of a choice of national industry concentration.[2] They also consider whether trade liberalisation might induce countries to use competition policy strategically in a "beggar-thy-neighbour" fashion, but do not find support for this. Our study differs from theirs in focus. While Horn and Levinsohn (2001) treat trade costs as *endogenously* determined by various government policies, we treat is as an *exogenous* variable driven by e.g., technological factors. The trade-off between consumer surplus in domestic markets (which will be reduced by most mergers) and profits attained by domestic firms in foreign markets (which are higher if mergers and collusion is allowed) is a central mechanism also in our study. However, we focus explicitly on how this trade-off is affected by the changes in trade volumes caused by growth of trade over time. This implies that we can study the relation between asymmetries in country size and the time when it is desirable for a country to adopt competition policy. We conceptualize the time path of trade volumes by introducing exogenously determined trade costs (e.g. transportation costs) and analyzing the effects of reduced trade costs on countries of different size.[3] We add to the

existing literature by considering how country size and trade costs jointly determine the optimal time for adopting a national competition policy. We study how this effect depends on whether the country under consideration is the first to adopt competition policy, or whether another country has already taken this step.

The paper is organised as follows. First, some stylised facts are presented. We then develop an oligopolistic trade model with trade costs and derive our main results. Results are derived analytically for the case of two firms producing in each country and with sales in both countries. Making the number of firms dependent on market size makes analytical expressions complicated and we provide numerical evaluations for this case. The final section concludes and discusses the policy implications of the results.

2 Stylised facts

The US introduced anti-trust legislation at a very early stage with the Sherman Act against monopolisation in 1890, and then extended its competition policy with several other laws, e.g. the Clayton Act, which prohibits certain marketing practises and restricts mergers, and the Federal Trade Commission Act, both from 1914. In contrast, a country like Sweden had virtually no competition law before 1993; the precursor to its present competition authority, the *Swedish National Price and Cartel Board*, counted as one of its tasks the public registration of cartels, which were in practice legal (see Fölster and Peltzman, 1993).

A very basic difference between countries lies in the size of their respective markets, and the US has been a very large economy since well before 1890. A possible hypothesis is that the size of an economy would have a bearing on the introduction of competition policies, i.e., that large countries pass competition legislation earlier than small countries. To investigate this we compiled data on the year of the first competition law for the 24 "high-income" OECD countries, i.e., not including the six entrants since 1994, namely Korea, Poland, the Czech Republic, Hungary, Mexico and the Slovak Republic. The latter countries became market economies at a considerably later stage and would have been less prone to introduce competition policy before that time.[4] This data is used to check whether country size, measured in terms

of GDP or population, can explain the introduction of competition policy. We also investigate the robustness of our conclusions and consider some alternative explanations.

For most countries there is some ambiguity about the time when competition policy was introduced. At the same time, it is desirable to use the same principle across countries in determining what is considered the starting year. The way we have handled this is to look for the year when a law that prohibits price-fixing was first introduced. In some cases there are strong indications that the first law was not enforced in practice, and there has then tended to be some subsequent legal development which has given us an alternative date. Of these, the dates that appear most convincing in terms introduction of competition law are used as our main set of "BestGuessLaw" years in the data analysis. However, we also investigate using the earliest date for each country in a set of "EarliestLaw" years. This data on the year of introduction of competition policy is provided in the Appendix/Data supplement where we also provide a short discussion for each country of the years used.

Figure 1 plots the "BestGuessLaw" year of first competition law against GDP in 1970 (measured at constant 1990 prices in billion US dollars).

It is obvious from Figure 1 that the US is extreme in terms of timing and that all the other countries considered passed their competition legislation after 1945. (If the EarliestLaw measure is used instead, there are some more relatively early adopters, see the Data supplement.) Limiting attention to countries that passed competition laws after 1945 yields Figure 2, which plots the "BestGuessLaw" year of first competition law against GDP in 1970 in billion USD at constant 1990 prices for all countries *except* the US.

Figure 1 includes a basic regression line with a significant negative slope (P-value 0.000). The negative slope of the regression line in Figure 2 is also highly significant (P-value 0.003).

These figures suggest a relation between country size and the timing of adoption of competition policy. To investigate the robustness of this relation, a number of regressions were run using different variables as control variables. The variables used were selected with some possible alternative hypothesis in mind.[5] To start out, we consider if Export share in GDP would explain our data better than GDP, with the argument that large countries tend to have
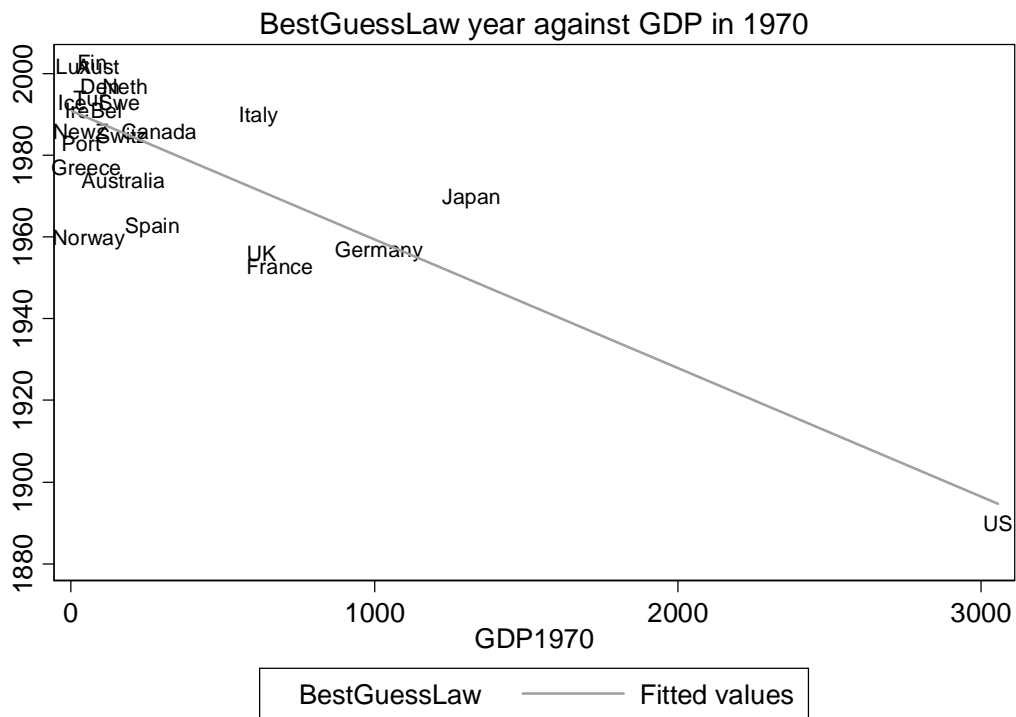
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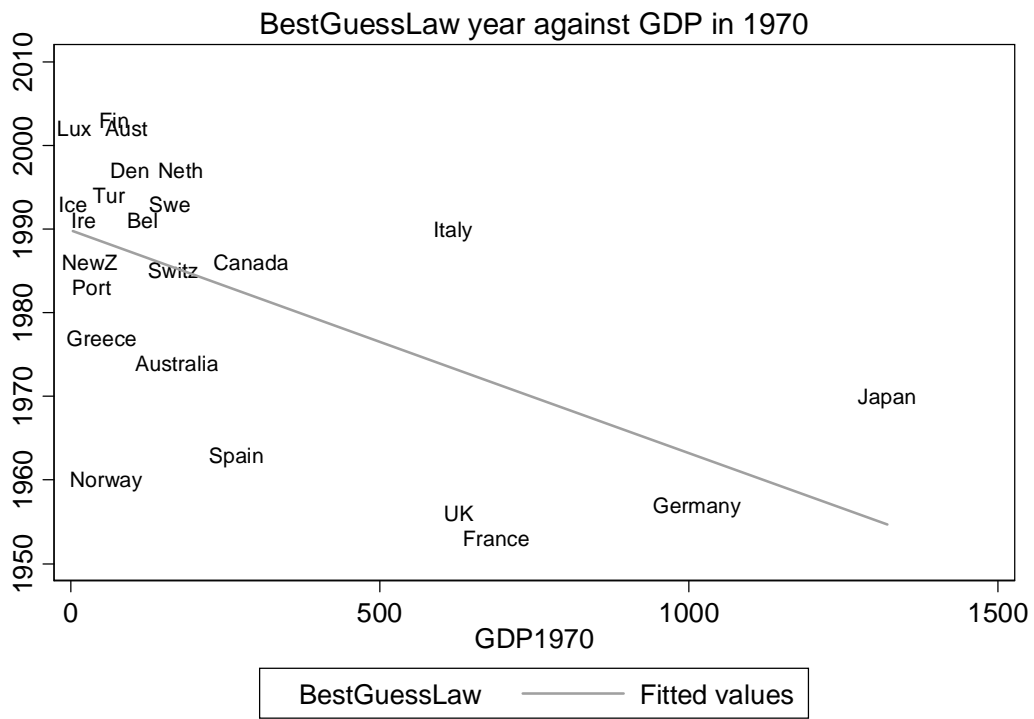Figure 1: Year of first competition law and GDP in 1970 for 24 OECD countries

Figure 2: Year of first competition law and GDP in 1970 for 23 OECD countries

smaller export sectors than small countries. By a different mechanism, a high Import share of GDP might imply later introduction of competition policy since countries with large imports might be in less need of competition policy to ensure competitive markets (see Clougherty and Zhang, 2005). We also consider the Share of government consumption in GDP, and per-capita GDP, both of which could matter if, e.g., the availability of human capital is important for implementation of policies. The same year was used for these macroeconomic variables, implying that it is the effect of each country's relative position that is investigated. The choice of year appears to have little effect since GDP only changes slowly over time, and we use 1970 and 1990. Regressions are shown in the Web appendix.[6] In all the regressions country size is strongly significant, while the control variables have no statistically significant effect (in one case Export share is weakly significant, see Table A7). Table 1 below reproduces Table A1.

Table 1. Dependent variable: BestGuessLaw. Regressors GDP1970 combined with Export share in GDP in 1970, Import share in GDP in 1970, Government share in GDP in 1970 and Per capita GDP in 1970. N=24.

constant	GDP1970	Xsh1970	Msh1970	Govsh1970	PCapGDP1970	R^2 adj
1985.7***	-0.030***	0.170	-	-	-	0.72
1987.6***	-0.030***	-	0.122	-	-	0.71
1986.6***	-0.032***	-	-	0.290	-	0.71
1985.6***	-0.032***	-	-	-	0.436	0.71
1983.6***	-0.032***	1.275	-1.305	0.597	-0.401	0.71

A different type of explanation has to do with ideas and ideology, and/or the quality of institutions in a country. Corrupt businesses might influence a government to delay the introduction of competition policy. Countries that make efforts to reduce income inequalities might be keen to use competition policy as one means to achieve this end. A strong ideological awareness of the advantages of competition should speed the introduction of competition policy, as mentioned in the introduction. Finally, many countries have introduced competition policies partly as a result of reducing economic regulation of, e.g., prices and entry. Countries with less regulation would tend to be more interested in competition policy. To investigate these kinds of effects we run regressions using Gini coefficients, data on corruption from the World Bank, the

Heritage Foundation index of economic freedom and an indicator of product market regulation from the OECD.[7] We find that corruption, the economic freedom index and the regulation indicator have some effect, but only for the EarliestLaw measure.[8] The country size measure remains significant, if somewhat less strongly so.

Another type of consideration is whether to impose time limits on the data set. Limiting the countries considered to those that introduced competition policy after 1945 has already been suggested, and follow this up in several regressions. The most noticeable changes are that export share and import share, as well as corruption and economic freedom (each when included separately), become significant with the EarliestLaw measure.[9] Still, country size remains significant although less strongly so. We also consider an above time limit at the year 1991 when negotiations were concluded on the Treaty of Maastricht which formed the European Union. Several small European countries introduced competition policy after this date.[10] Country size remains as the variable that consistently and significantly affects the timing of competition policy adoption. Table 2 reproduces Table A11.

Table 2. Dependent variable: BestGuessLaw. Time limit: the Best Guess year is after 1945. Regressors: GDP1990 combined with Gini coefficients for a year between 1987 and 1995, Corruption in 1996, The Heritage foundation freedom index for 1996 and the OECD Product market regulation indicator for 1998. N=22 (23 in the second row).

constant	GDP1990	Gini	Corrup	Heritage	PMR	R^2 adj
2007.9***	-0.012***	-0.612	-	-	-	0.24
1990.3***	-0.012**	-	-0.215	-	-	0.21
1987.8***	-0.012**	-	-	-0.006	-	0.19
1984.1***	-0.011**	-	-	-	1.713	0.19
1964.2***	-0.016**	-1.313	-2.504	1.204	2.857	0.12

Finally, we investigate country size at the time of introduction of competition policy. This could be a relevant variable, e.g., if the fixed cost of running a competition authority was a decisive influence on the date of introduction of policy. To consider this, we define a new measure of country size, namely "population *at the year of adoption* of competition policy" (rather than country size at one particular year as previously). Regressions are run using each

country's population at the BestGuessLaw year as the measure of country size, and also using population relative to the population in the US at the BestGuessLaw year as the measure of country size.[11] Here, although absolute population in the BestGuessLaw year is significant in two out of three cases, population relative to US population is strongly significant in all three cases. This suggests that relative country size is a more important factor than absolute size in determining the timing of adoption of competition policy. While it may still be true that countries wait with introducing competition policy until the size of their economy has reached some level, due to for example the fixed costs of running the competition policy, factors to do with relative size appear to be important. Table 3 shows the regressions for the 24 countries (identical with Table A18).

Table 3. Dependent variable: BestGuessLaw Regressors: population in the Best Guess year and population relative to the US population in the Best Guess year. N=24.

constant	population in BG year	population rel. to US pop in BG year	R^2 adj
1990.3***	-0.462**	-	0.23
1992.4***	-	-92.080***	0.70

Thus when investigating a number of different explanations for the differences in timing of adoption of competition policy, we find throughout that the coefficient for country size is negative and significant, and the values it takes are stable. The regressions thus confirm the pattern for the effect of country size on the year of introduction of competition legislation visible in Figures 1 and 2: larger countries introduce competition policy earlier than smaller countries. The negative correlation between the time of introduction of competition policy and GDP or population remains significant in almost all the regressions that we have tried, including those that are not shown here. We also find that some additional factors, notably economic freedom and regulation, contribute to explaining the introduction of competition policy. This is in line with the findings by Clougherty (2005) and Kronthaler and Stephan (2007). Comparing with previous studies, few of our control variables turn out to significantly affect the adoption of competition policy. This could be explained by the fact that we consider a different dependent variable and a relatively small set of industrialised countries. In the subsequent analysis we will focus on country size and we now turn to a theoretical investigation of the mechanisms through

which a country's size may influence the time when it introduces competition policy.

3   The model

3.1   Basics

There are two countries, the home country (H) and the foreign country (F), and four firms. Firms 1 and 2 are located in H and firms 3 and 4 in F. Firms produce homogenous products and compete à la Cournot, in both markets. Markets are segmented so each firm chooses two quantities, one for the domestic market and one for the export market. The countries differ in size and country j has ℓ^j identical inhabitants. The representative consumer in each country has the utility function

$$U^j = \alpha q^j - \frac{1}{2}(q^j)^2 + I, \tag{1}$$

q^j being the per capita quantity consumed in country $j \in \{H, F\}$. Hence, utility is quadratic in the traded good and linear in a composite good, I, which represents the part of the budget that is spent on other non-traded consumption goods. Let p^j denote the price of the traded good in country j, and let m be the per capita income, which is equal across countries. Then $I = m - p^j q^j$. Firm i's output in country j's market is given by Q_i^j i.e., $q^j = \frac{1}{\ell^j} \sum Q_i^j$. Utility maximisation leads to the following individual demand functions:

$$p^j = \alpha - q^j \tag{2}$$

The production technology is characterised by zero marginal cost but a positive fixed production cost, denoted by f. Firms incur a per unit trade cost τ when exporting.

The objective of the government is to choose the competition policy that maximises domestic welfare, W^j, as measured by the sum of aggregate utility and domestic profits.[12] Note that these welfare components can be readily aggregated since the utility function is quasi-linear. Hence, denoting firm profits by π_i, domestic welfare in H equals $W^H = \ell^H U^H + \pi_1 + \pi_2$ while welfare in F is defined analogously. Firm i's profit is the sum of profits earned in the local

market and profits earned in the export market. Consequently, for a firm k located in country H:

$$\pi_k = Q_k^H(\alpha - \frac{1}{\ell^H}\sum Q_i^H) + Q_k^F(\alpha - \frac{1}{\ell^F}\sum Q_i^F - \tau) - f, \quad k \in \{1,2\}. \tag{3}$$

By analogy, if firm k is located in country F:

$$\pi_k = Q_k^H(\alpha - \frac{1}{\ell^H}\sum Q_i^H - \tau) + Q_k^F(\alpha - \frac{1}{\ell^F}\sum Q_i^F) - f, \quad k \in \{3,4\}. \tag{4}$$

It is assumed that synergies in terms of fixed costs are such that if two firms collude or merge, the joint profit of the two colluding firms is always larger than the sum of profits without collusion.

3.2 Unilateral competition policy

In this section, we will show that large countries have a stronger incentive to start implementing competition policy than small countries. Hence, we ask under what conditions a country (here country H) would unilaterally want to start preventing firms from colluding or start implemementing a strict merger policy. The point of departure is a world without competition or merger policy. We define competition policy, which is taken to be the same thing as anti-trust policy, as follows.

DEFINITION 1 *When a country has a national competition policy, the firms located in the country will make independent decisions about quantities sold in both the domestic market and the export market.*

The definition implies that national competition policy is based on the country of origin. We subsequently consider how sensitive our results are to this definition. For simplicity, we do not explicitly take into account the administrative costs associated with the implementation of competition policy. We assume that when neither of the countries has a competition policy, firms 1 and 2 will collude or merge, as will firms 3 and 4. It is assumed that collusion or mergers across borders is not possible. Hence, in this scenario local firms jointly choose production

quantities for the local market as well as for the export market, given the expected quantites produced by the foreign firms in these markets. Solving for the Nash equilibrium given these assumptions yields the following quantities:

$$Q_1^H = Q_2^H = \frac{\ell^H(\alpha + \tau)}{6} \tag{5}$$

$$Q_3^H = Q_4^H = \frac{\ell^H(\alpha - 2\tau)}{6} \tag{6}$$

$$Q_1^F = Q_2^F = \frac{\ell^F(\alpha - 2\tau)}{6} \tag{7}$$

$$Q_3^F = Q_4^F = \frac{\ell^F(\alpha + \tau)}{6} \tag{8}$$

which in turn implies that joint profits equal

$$\pi_1 + \pi_2 = \frac{\ell^H(\alpha + \tau)^2 + \ell^F(\alpha - 2\tau)^2}{9} - 2\sigma f, \tag{9}$$

where $\sigma < 1$ measures the strength of synergies in fixed costs. The consumer surplus is

$$U^H = m + \frac{(2\alpha - \tau)^2}{18}. \tag{10}$$

Hence, aggregate welfare becomes

$$W^H = \frac{\ell^H(\alpha + \tau)^2 + \ell^F(\alpha - 2\tau)^2}{9} - 2\sigma f + \ell^H m + \frac{\ell^H(2\alpha - \tau)^2}{18}, \tag{11}$$

where profit and consumer surplus are written separately to simplify welfare comparisons below.

The welfare in (11) may be compared to a situation where country H unilaterally introduces competition policy. If a competition policy is implemented in country H, Q_1^H and Q_2^H as well as Q_1^F and Q_2^F are chosen independently of each other. The corresponding Nash equilibrium implies the following set of quantities and welfare measures:

$$Q_1^H = Q_2^H = \frac{\ell^H(\alpha + \tau)}{4} \tag{12}$$

$$Q_3^H = Q_4^H = \frac{\ell^H(\alpha - 3\tau)}{8} \tag{13}$$

$$Q_1^F = Q_2^F = \frac{\ell^F(\alpha - 2\tau)}{4} \tag{14}$$

$$Q_3^F = Q_4^F = \frac{\ell^F(\alpha + 2\tau)}{8} \tag{15}$$

$$\widetilde{\pi}_1 + \widetilde{\pi}_2 = \frac{\ell^H(\alpha + \tau)^2 + \ell^F(\alpha - 2\tau)^2}{8} - 2f \tag{16}$$

$$\widetilde{U}^H = m + \frac{(3\alpha - \tau)^2}{32} \tag{17}$$

$$\widetilde{W}^H = \frac{\ell^H(\alpha + \tau)^2 + \ell^F(\alpha - 2\tau)^2}{8} - 2f + \ell^H m + \frac{\ell^H(3\alpha - \tau)^2}{32}. \tag{18}$$

Note from (6), (7), (13) and (14) that a necessary and sufficient condition for interior solutions in terms of quantities is that trade costs are not too high, more specifically that $\tau \leq \frac{1}{3}\alpha \equiv \bar{\tau}$. For $\frac{1}{2}\alpha > \tau > \frac{1}{3}\alpha$ the foreign country will not sell in the domestic market after the home country has adopted a competition policy, and for $\tau \geq \frac{1}{2}\alpha$ there is no trade with or without competition policy. We henceforth assume $\tau \leq \bar{\tau}$.

Now, under the assumption that F does not adopt a competition policy, define Δ^H as the difference between aggregate welfare in H with and without competition policy:

$$\Delta^H \equiv \widetilde{W}^H - W^H = L\frac{s^H(\alpha + \tau)^2 + (1 - s^H)(\alpha - 2\tau)^2}{72} - 2f(1 - \sigma) + L\frac{s^H\left(17\alpha^2 + 10\alpha\tau - 7\tau^2\right)}{288}, \tag{19}$$

where $L \equiv \ell^H + \ell^F$, and $s^H \equiv \frac{\ell^H}{L}$. The first two terms of expression (19) measure the difference in profits, and the last term measures the difference in consumer surplus. This leads us to Propositions 1 and 2.

PROPOSITION 1 *Large countries have relatively stronger incentives to adopt a competition policy.*

Proof: The statement follows from the fact that for $\tau \leq \bar{\tau}$, $\frac{\partial \Delta^H}{\partial s^H} > 0$.

PROPOSITION 2 *The benefit of adopting a competition policy is increasing in τ for large countries. Specifically, for a country j, $\frac{\partial \Delta^H}{\partial \tau} > 0$, for $\tau \leq \bar{\tau}$, if $s^j > 8/17$.*

Proof: From (19)

$$\frac{\partial^2 \Delta^H}{\partial s^H \partial \tau} = \frac{L}{144}(17\alpha - 19\tau) > 0 \quad \text{for} \quad \tau \leq \bar{\tau}$$

which implies that $\frac{\partial \Delta^H}{\partial \tau}$ increases monotonically in s^H. Next, the s^H that solves $\frac{\partial \Delta^H}{\partial \tau} = 0$ is given by

$$\frac{8\alpha - 16\tau}{17\alpha - 19\tau}.$$

The highest value of this expression for $\tau \in [0, \frac{\alpha}{3}]$ is given by $\frac{8}{17}$ for $\tau = 0$.

There are two effects accounting for Proposition 1. First, the adoption of a competition policy obviously increases the consumer surplus and the more consumers in country H, i.e., the larger country H is, the more important is this effect. Note that since the number of firms is equal and constant in the two countries (an assumption that will be relaxed later on), the larger the domestic economy the more important is the consumer surplus also in relative terms. Let us call this effect the *consumer surplus effect*. Second, competition policy raises variable firm profits by making home country firms more aggressive in the product markets, i.e., there is also a *strategic effect*. Hence, two separate firms earn higher variable profits than one integrated (i.e., merged) firm.[13] The strategic effect is reinforced the larger the fraction of consumers living in the home country, that is the market where home country firms have a cost advantage as well. By the same logic the value of competition policy must increase in the absolute size of the two countries (L). This is confirmed by (19).

Proposition 2 deals with the slope of Δ^H as trade costs (the level of integration) change. Differentiating Δ^H with respect to τ we have

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$$\frac{\partial \Delta^H}{\partial \tau} = L \frac{s^H(\alpha + \tau) - 2(1 - s^H)(\alpha - 2\tau)}{36} + L \frac{s^H(5\alpha - 7\tau)}{144}, \tag{20}$$

where the first term measures how trade costs influence the strategic effect on variable profits and the second term measures the impact on the consumer surplus effect.[14] The sign of this expression turns out to hinge critically on the relative size of the two countries. The effect on consumer surplus is straightforward. The larger the trade costs, the more market power will local firms have, and the stronger the effect on consumer prices from implementing a competition policy. Hence, the second term is always positive. The first term is positive when country H is large. To see why this is the case, note that when H is large, most profits are captured in the home market and the strategic effect on profits earned in the home market is reinforced if local firms enjoy a large cost advantage, that is if τ is large.

From Propositions 1 and 2 it follows that large countries, like the US, are likely to adopt competition policy when trade costs are high; that is, they are likely to be early adopters. This is especially so since there may be administrative or other costs involved when implementing competition policy, implying that Δ^H will need to exceed some minimum level before the country would consider introducing the policy.

3.3 Multilateral competition policy

Given that a large country H has adopted a competition policy, when will a smaller country F want to do the same? In order to answer this question we first calculate equilibrium quantities and welfare measures for the case when both countries have adopted competition policies. Then we calculate the welfare in F when only H has adopted a competition policy. Finally, the welfare gains for country F from introducing a competition policy are discussed.

When both countries have a national competition policy, output decisions are made independently. The corresponding Nash equilibrium implies the following set of quantities and welfare measures:

$$Q_1^H = Q_2^H = \frac{\ell^H(\alpha + 2\tau)}{5} \tag{21}$$

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$$Q_3^H = Q_4^H = \frac{\ell^H(\alpha - 3\tau)}{5} \tag{22}$$

$$Q_1^F = Q_2^F = \frac{\ell^F(\alpha - 3\tau)}{5} \tag{23}$$

$$Q_3^F = Q_4^F = \frac{\ell^F(\alpha + 2\tau)}{5} \tag{24}$$

$$\widetilde{\pi}_3 + \widetilde{\pi}_4 = \frac{2\left[\ell^H(\alpha - 3\tau)^2 + \ell^F(\alpha + 2\tau)^2\right]}{25} - 2f \tag{25}$$

$$\widetilde{U}^F = m + \frac{2(2\alpha - \tau)^2}{25} \tag{26}$$

$$\widetilde{W}^F = \frac{2\left[\ell^H(\alpha - 3\tau)^2 + n^F(\alpha + 2\tau)^2\right]}{25} - 2f + \ell^F m + \frac{2\ell^F(2\alpha - \tau)^2}{25}. \tag{27}$$

If, on the other hand, country H adopts a competition policy while firms in F collude or merge, the corresponding Nash equilibrium quantities are given by (12), (13), (14), and (15) and profit and welfare measures in F are:

$$\pi_3 + \pi_4 = \frac{\ell^H(\alpha - 3\tau)^2 + \ell^F(\alpha + 2\tau)^2}{16} - 2\sigma f \tag{28}$$

$$U^F = m + \frac{(3\alpha - 2\tau)^2}{32} \tag{29}$$

$$W^F = \frac{\ell^H(\alpha - 3\tau)^2 + \ell^F(\alpha + 2\tau)^2}{16} - 2\sigma f + \ell^F m + \frac{\ell^F(3\alpha - 2\tau)^2}{32}. \tag{30}$$

Now, under the assumption that H adopts a competition policy, define Δ^F as the difference between aggregate welfare in F with and without competition policy.

$$\Delta^F \equiv \widetilde{W}^F - W^F = 7L\frac{\left(1 - s^F\right)(\alpha - 3\tau)^2 + s^F(\alpha + 2\tau)^2}{400} - 2f(1 - \sigma) + L\frac{s^F\left(31\alpha^2 + 44\alpha\tau - 36\tau\right)}{800}, \tag{31}$$

where $s^F \equiv \frac{\ell^F}{L}$. The first two terms measure the difference in profits and the last term measures the difference in consumer surplus. This leads us to Proposition 3.

PROPOSITION 3 *A larger country has stronger incentives to follow the other country and adopt a competition policy.*

Proof: The statement follows from the fact that for $\tau \leq \bar{\tau}$, we have that $\frac{\partial \Delta^F}{\partial s^F} > 0$.

The intuition is again simply that a large country has more consumers and therefore cares more about the consumer surplus, which always increases as competition policy is introduced. Moreover, the strategic gain from becoming more aggressive is larger the larger the home market, i.e,. the market where home based firms have a cost advantage.

PROPOSITION 4 *The benefit of introducing competition policy, given that the other country has done so, falls as trade costs are reduced for relatively large countries $\left(s^F > \frac{21}{46}\right)$. For smaller countries reductions in trade costs will eventually favour the adoption of a competition policy. For even smaller countries $\left(s^F < \frac{63}{223}\right)$ the incentives to adopt a competition policy are maximal for $\tau = 0$.*

Proof: Note that Δ^F is convex in τ and that $\frac{\partial \Delta^F}{\partial \tau} > 0$ for $\tau = \bar{\tau}$. The first and second statements follow from the fact that $\frac{\partial \Delta^F}{\partial \tau} > 0$ for all $\tau < \bar{\tau}$ if and only if $s^F > \frac{21}{46}$. The second statement follows from the fact that $\Delta^F(0) > \Delta^F(\bar{\tau})$ for $s^F < \frac{63}{223}$.

The interpretation is similar as for Proposition 2. The consumer surplus effect from implementing a competition policy is increasing in τ since for high trade costs, import competition cannot discipline local firms much. When F is large, a large fraction of the profits is captured in the local market. Again, the strategic effect on profits earned in the local market is stronger if local firms enjoy a large cost advantage, i.e., if τ is large. Hence, if F is large both the consumer surplus effect and the strategic effect are reinforced by high trade costs. If F is small the situation is slightly more complex. Then, since most profits are earned in the *export* market the strategic effect becomes stronger the smaller the cost *dis*advantage, i.e., the *smaller* τ is. At the same time, if F is small, the welfare weight put on consumer surplus will also be small.

Thus, the overall incentives to adopt a competition policy is largest for low trade costs, despite the fact that consumers value competition policy more at high trade costs.

In sum, if country F is large, both firms and consumers will benefit most from competition policy, in terms of variable profits and aggregate utility, when trade costs are high. If country F is small its firms will gain most from competition policy, in terms of variable profits, when trade costs are low, while its consumers gain most at high trade costs. However, if the home country is small the weight put on consumer utility is small so the profit effect will dominate. The analysis, thus, shows how large countries are likely to be early adopters of competition policy, and how small countries may be expected to follow later when integration has proceeded far enough.

It should be noted that there are other plausible definitions of *competition policy*. The definition that we use is based on a so called *origin principle*, i.e., we assume that competition agencies control the behavior of domestic firms both in the domestic market and in the export market. Thinking of competition policy in terms of merger regulation, this is probably a reasonable assumption. When thinking about collusion it is conceivable that competition agencies primarily control the behaviour of firms selling in domestic markets, the so called *destination principle*.[15]

In Web appendix B we show that our main findings are robust to the application of a destination principle. One should bear in mind, however, that such a principle introduces an asymmetry among colluding firms. Hence, cartel objectives become somewhat arbitrary. Assuming joint profit maximisation and side payments, imports would simply drop to zero. To avoid this extreme outcome, we assume that side payments are not possible and that firms maximise joint profits subject to the constraint that market shares are held fixed at the competitive levels. In such a framwork, larger countries have stronger incentives to unilaterally implement a competition policy. At the same time, the benefit of adopting a competition policy once the large country has done so is decreasing in the level of trade costs. Hence, given that there are implementation costs, trade costs have to be reduced a lot for small countries to follow. The intuition for the first result is basically the same as before. A large country has more consumers

and therefore cares more about the consumer surplus, which always increases as competition policy is introduced. The intuition for the second result is somewhat different in this alternative setting. For countries that are small in terms of population, firm profits have a relatively large welfare weight. As trade costs are reduced, foreign firms capture a larger fraction of the collusive profits. Hence, the loss of adopting a competition policy, in terms of firm profits, is reduced as trade costs go down. Moreover, since lower trade costs make import competition fiercer when firms are *not* colluding, the effect on domestic consumer prices from adopting a competition policy is larger the lower the trade cost. This means that the gain in terms of consumer surplus is largest at low trade costs.

3.4 Asymmetric market structures

Throughout the paper it has been assumed, for analyical convenience, that there are two firms in each country. We now relax this assumption and recognise that a larger market typically contains more firms. Since issues like mergers and collusion are conceptually difficult to handle under free entry we choose an alternative approach. It is assumed that the number of firms in market j is

$$n^j = g \cdot (\ell^j)^\gamma, \tag{32}$$

where $g, \gamma > 0$.

The first-order conditions generating the equilibrium quantities can be found by maximising expressions (3) and (4) under arbitrary market structures. For notational convenience, let quantity subscripts denote the country of production and superscripts the country of consumption. Then, using symmetry, the first-order conditions in the absence of competition policy will be

$$\frac{\partial \pi^H}{\partial Q_H^H} = \alpha - \frac{1}{\ell^H}(n^F Q_F^H + 2n^H Q_H^H) = 0 \tag{33}$$

$$\frac{\partial \pi^H}{\partial Q_H^F} = \alpha - \frac{1}{\ell^F}(n^F Q_F^F + 2n^H Q_H^F) - \tau = 0 \tag{34}$$

$$\frac{\partial \pi^F}{\partial Q_F^H} = \alpha - \frac{1}{\ell^H}(n^H Q_H^H + 2n^F Q_F^H) - \tau = 0 \tag{35}$$

$$\frac{\partial \pi^F}{\partial Q_F^F} = \alpha - \frac{1}{\ell^F}(n^H Q_H^F + 2n^F Q_F^F) = 0, \tag{36}$$

and quantities are given by

$$Q_H^H = \frac{\ell^H(\alpha + \tau)}{3n^H}, Q_H^F = \frac{\ell^F(\alpha - 2\tau)}{3n^H}, Q_F^F = \frac{\ell^F(\alpha + \tau)}{3n^F}, Q_F^H = \frac{\ell^H(\alpha - 2\tau)}{3n^F}. \tag{37}$$

By analogy, the first-order conditions in the presence of competition policy are

$$\frac{\partial \pi^H}{\partial Q_H^H} = \alpha - \frac{1}{\ell^H}(n^F Q_F^H + (n^H + 1)Q_H^H) = 0 \tag{38}$$

$$\frac{\partial \pi^H}{\partial Q_H^F} = \alpha - \frac{1}{\ell^F}(n^F Q_F^F + (n^H + 1)Q_H^F) - \tau = 0 \tag{39}$$

$$\frac{\partial \pi^F}{\partial Q_F^H} = \alpha - \frac{1}{\ell^H}(n^H Q_H^H + (n^F + 1)Q_F^H) - \tau = 0 \tag{40}$$

$$\frac{\partial \pi^F}{\partial Q_F^F} = \alpha - \frac{1}{\ell^F}(n^H Q_H^F + (n^F + 1)Q_F^F) = 0, \tag{41}$$

with quantities

$$Q_H^H = \frac{\ell^H(\alpha + n^F\tau)}{1 + n^H + n^F}, Q_H^F = \frac{\ell^F(\alpha - (1 + n^F)\tau)}{1 + n^H + n^F}, Q_F^F = \frac{\ell^F(\alpha + n^H\tau)}{1 + n^H + n^F}, Q_F^H = \frac{\ell^H(\alpha - (1 + n^H)\tau)}{1 + n^H + n^F}. \tag{42}$$

Finally, in the intermeduate case where country H adopts a competition while country F does not, first-order conditions are given by (35), (36), (38) and (39). The resulting quantities are

$$Q_H^H = \frac{\ell^H(\alpha + \tau)}{2 + n^H}, Q_H^F = \frac{\ell^F(\alpha - 2\tau)}{2 + n^H}, Q_F^F = \frac{\ell^F(\alpha + n^H\tau)}{n^F(2 + n^H)}, Q_F^H = \frac{\ell^H(\alpha - (1 + n^H)\tau)}{n^F(2 + n^H)}. \tag{43}$$

Note that the condition ensuring interior solutions for all firms is somewhat different under this general formulation, namely that $\tau \leq \bar{\tau} \equiv \min\{\alpha/(1 + n^F), \alpha/(1 + n^H)\}$.

Unilateral competition policy   The welfare effect of a unilateral adoption of competition policy by H corresponding to (19), can be simplified to the following expression

$$\Delta^H \equiv \widetilde{W}^H - W^H = \frac{1}{18(2 + n^H)^2}[((n^H + 2)^2 - 9)3l^H\alpha^2 + (n^H - 1)18l^H\tau\alpha \tag{44}$$

$$-(n^H - 1)^2 3l^H\tau^2 + (n^H - (n^H - 2)^2)2l^F(\alpha - 2\tau)^2] - n^H f(1 - \sigma),$$
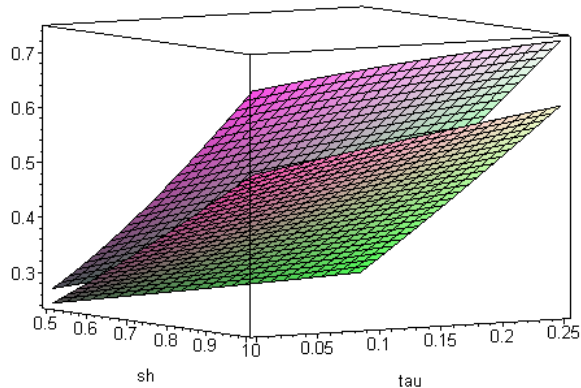
Figure 3: The welfare gain from unilateral competition policy

where $n^j = g(l^j)^\gamma$.

It turns out to be difficult to sign this difference analytically. It is likewise difficult to show analytically that $\frac{\partial \Delta^H}{\partial s^H} > 0$ as in Proposition 1. Instead we evaluate the expression numerically. Figure 3 shows two surface plots of (44) for different levels of trade costs and different relative size of the two countries. The upper surface corresponds to $\gamma = 0.9$ and the lower to $\gamma = 0.3$. The results hold also for $\gamma > 1$, but since empirical evidence, by e.g., Asplund and Sandin (1999), indicate that $\gamma < 1$, we focus on this case. Other parameter values are $\alpha = 1, g = 2, f = 0.1, \sigma = 0.9$, and $L = 5$. Results do not appear to be sensistive to the choice of specific parameter values.

The figure shows how the value of unilateral competition policy increases in the size of the country and that it decreases when trade costs fall (Proposition 1). Also the surfaces shift up with γ, implying that the large country's incentive to introduce competition policy is increasing in γ.

Multilateral competition policy The expression for the welfare effect of the late adopter is tedious.[16] Figure 4 shows a surface plot of the expression in the τ, s_F space. Again parameter values are $\alpha = 1, g = 2, f = 0.1, \sigma = 0.9$, and $L = 5$. Also the size of the small country
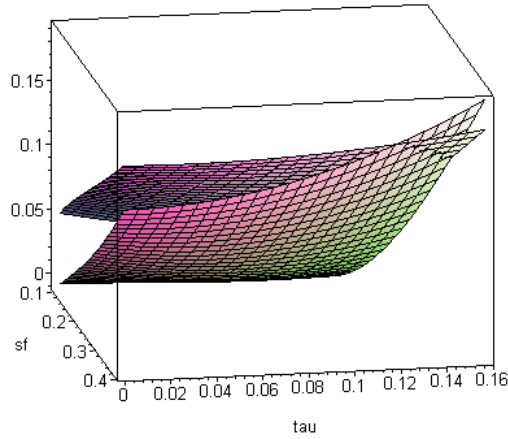
Figure 4: The welfare effect of introducing competition policy for the follower country.

must be large enough to keep $n \geqslant 1$. The figure shows how a larger follower country has a stronger incentive to adopt competition policy (Proposition 3). It also illustrates how the value of following decreases with falling trade costs for large countries while it increases for small countries (Proposition 4).

The effect of γ is illustrated by the two surfaces in Figure 4. The upper surface now corresponds to $\gamma = 0.3$ and the lower to $\gamma = 0.9$. When there are many foreign firms, the value of making home based firms more aggressive, by breaking up domestic cartels, is simply small. The surfaces cross when the follower country has suffiently many firms in relation to the other country.

The numeric analysis shows that the asymmetric case reproduces the results from previous sections. The analytical results from the symmetric case are thus largely robust to the introduction of an asymmetric market structure.

4   Concluding discussion

This paper presents stylised empirical evidence from OECD countries showing how small countries have historically been late in introducing competition policy. The negative correlation between the size of countries and the time before introducing competition policy is shown to

be robust to the introduction of a number of control variables. We thereafter analyse a model with two countries of different size separated by trade costs where firms compete à la Cournot. The model illustrates how large countries have the strongest incentives to introduce competition policy when trade costs are high, whereas small countries have incentives to follow only once trade costs have come down. Given that trade costs have fallen over the course of the 20th century, this is consistent with the observed empirical regularity.

The basic mechanism in the model is that competition policy forces domestic firms to set quantities independently, and thereby essentially gives them a strategic advantage compared to foreign firms. This advantage increases more than proportionally with market size. For firms in a large country the home market is of dominant importance, and since high trade costs reinforce this dominance they also increase the value of competition policy in terms of variable profits. For firms in a small country the foreign market is of dominant importance, and competition policy is therefore most valuable, in terms of variable profits, at low trade costs. Finally, the gain in consumer welfare from competition policy is largest at high trade costs in any country, since then the competitive pressure is weak. Hence, in a large country both consumers and firms would prefer to implement competition policy at high trade costs. This is not the case in small countries. However, since there are few consumers in a small country, firms' interests still dominate government policy even though we assume that governments weigh profits and consumer surplus equally. This also implies that assuming that firms have a stronger influence than consumers, e.g., through lobbying (see Grossman and Helpman (1994)), would probably not alter our results, and a "competition policy for sale" variant of our model would yield very similar results to the present version. In large countries firms have weak incentives to lobby against the implementation of competition policy when trade costs are high. For small countries the opposite relation holds.

Other factors than country size are likely to contribute to the decision to adopt a competition policy, see our review of other empirical studies in the Introduction. Some of these, like product market regulation and economic freedom, show up with significant effects in our data, although country size appears as the most consistently influential factor. Others, like the level of economic

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development, do not figure prominently in our study of industrialised countries but may play an important role for developing countries. For example, a country that introduces a competition policy has to take on the financing of a competition authority that is responsible for seeing that the legislation is enforced. While this may be a limited undertaking for a developed country, it may be a severe limitation for a poor country with limited supply of human capital.

Even though this paper attempts to explain the historical pattern of the introduction of competition policy, it has forward-looking implications. One implication of our model is that globalisation may give very different incentives regarding competition policy for small and large developing countries. Small countries are likely to favour adoption of competition policy once they are sufficiently integrated in the world trading system. For large countries, such as China and India, the situation may be different. Their incentives to implement competition policy may be stronger at an early stage of integration.

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Notes

[1]This receives some support in the model since, with zero trade costs and tariffs, home country welfare decreases with the number of home country firms when imports are small relative to exports.

[2]A somewhat similar analysis, also including a discussion of customs unions, is found in Richardson (1999).

[3]Baldwin et al. (2001) present some direct evidence of falling transportation and communication costs. Increasing trade shares also constitute strong indirect evidence. See e.g. O'Rouke and Williamson (1999).

[4]Note however that the European countries were market economies before the Second World War.

[5]Several of the hypotheses were suggested to us by an anonymous referee.

[6]Tables A1, A2 use BestGuessLaw as the dependent variable, Tables A4, A5 use EarliestLaw, and Tables A7, A8 use population instead of GDP as the country size measure.

[7]The regressions are presented in the Web appendix, Tables A3 (BestGuessLaw), A6 (EarliestLaw), A9 (population as measure of country size).

[8]When these indexes/indicators are considered separately and each together with GDP, they are significant at the ten percent (corruption and economic freedom) or five percent (regulation) level (regressions # 27, 28 and 29 in Table A6).

[9]See Tables A10, A11, A12, A13 (regressions # 62 and 63).

[10]Regressions are in Tables A14, A15, A16 (the number of countries is particularly reduced with the BestGuessLaw data).

[11]Regressions are in tables A18 (no time limit), A19 (post-1945) and A20 (pre-1991).

[12]Most jurisdictions that apply a merger policy use a consumer welfare standard to evaluate mergers. A notable exception is Canada, where a total welfare standard is used (see OECD 2002a). When the issue at hand is whether or not a country should impose competition policy to begin with, we argue that the most relevant welfare measure is aggregate welfare.

[13]This means that mergers have to be motivated partly by efficiency gains. In this sense our framework is similar to, e.g., Horn and Levinsohn (2001) and most other studies in the field. In the absence of such gains firms in Cournot markets would disintegrate into a world of perfect competition. See Salant, Switzer and Reynolds (1983), and Perry and Porter (1985). The strategic incentives to increase the number of competing units under quantity competition is thoroughly discussed in Baye, Crocker and Ju (1996).

[14]Note that the effect of competition policy on overall profits is always negative, due to cost synergies. However, cost synergies do not depend on trade costs and the effect of competition policy on variable profits may be increasing or decreasing in τ.

[15]This was pointed out to us by an anonymous referee.

[16]The expression is:

$$\frac{1}{2}(((L\tau^2 + f(\sigma - 1))n^F - L\tau^2)2(n^H)^4$$

$$+(4f(\sigma - 1)(n^F)^2 + (\sigma - 1)f12n^F + (6La\tau - 10s_H L\tau + 2L\tau^2(1 + 3s_H))(n^F - 1))(n^H)^3$$

$$+((\sigma - 1)2f(n^F)^3 + ((1 - s_H)2La\tau + L\tau^2(s_H - 3) + 20f(\sigma - 1))(n^F)^2$$

$$+(La\tau(8 - 20s_H) + 26f(\sigma - 1) + 2L\tau^2(1 + 6s_H) + 2La^2(2 - s_H))n^F$$

$$+L\tau^2(1 - 13s_H) - 10La\tau + 22s_H La\tau + 2La^2(s_H - 2))(n^H)^2$$

$$+(8f(\sigma - 1)(n^F)^3 + (2La^2(1 - s_H) + 32f(\sigma - 1) + 2La\tau(3s_H - 1) - 4s_H L\tau^2)(n^F)^2$$

$$+(24f(\sigma - 1) + 2La^2(3 - s_H) + 4La\tau(1 - 5s_H) + 12s_H L\tau^2)n^F$$

$$-2La\tau + 14s_H La\tau - 8s_H L\tau^2 + 4La^2(s_H - 2))n^H + 8f(\sigma - 1)(n^F)^3$$

$$+(16f(\sigma - 1) + La^2(1 - 3s_H) - 2s_H L\tau^2 + 4s_H La\tau)(n^F)^2$$

$$+(8f(\sigma - 1) + 2La^2(1 + s_H) + 4s_H L\tau^2 - 8s_H La\tau)n^F + 4s_H La\tau - 3La^2 - 2s_H L\tau^2 + s_H La^2)$$

$$/((1 + n^H + n^F)^2(n^H + 2)^2)$$

5   Appendix with data supplement and regressions

To determine the year of the first competition law we have looked at the legal development in this field for each country. A competition law is taken to mean a law that is concerned with increasing competition and thereby indirectly reducing prices, such as a law prohibiting cartels and/or merger to monopoly. A typical competition law is thus a per se prohibition of collusion/price fixing, rather than a form of abuse principle, which would forbid anti-competitive behaviour only if it leads to undesirable results, e.g. high prices. It can sometimes be difficult to know which of these two extremes that best describe an actual law (see Christiansen and Kerber, 2006), and we have therefore in cases of doubt included more than one date (e.g. for Denmark and Austria). This is also done when sources explicitly indicate that an early competition law was not enforced. However, price-regulation is not considered as competition policy here, and laws that regulate prices directly are not counted as competition laws. Sources of information are OECD reports within the "Reviews of Competition Policy Frameworks", which are available for most but not all OECD countries, complemented with the countries' annual reports on competition policy to the OECD and other material.

Data on GDP (at constant 1990 prices in billion US Dollars), Exports, Imports, Per capita GDP and Government consumption is from the United Nations National Accounts Main Aggregates Database, available at unstats.un.org. Historical population data is from http://www.populstat.info/. Gini coefficients (not available for Iceland) for a year between 1987 and 1995 are from the United Nations University WIDER World Income Inequality Database, available at www.wider.unu.edu. The corruption measure is for 1996 and adds six measures taken from Kaumann, Kraay & Mastruzzi (2003), namely, Voice and accountability, Political stability, Government effectiveness, Regulatory quality, Rule of law, and Control of corruption. The Heritage index data is the Heritage Foundation's Index of economic freedom for 1996, which is the first year that covers almost all our countries, available at www.heritage.org/Index. This index is based on measures of 10 different "freedoms" in terms of, e.g., how easy it is to start a business, (lack of) trade restrictions, government size. The data on product market regulation is the OECD Indicators of Product Market Regulation (PMR) for 1998 which was the first year, available at www.oecd.org.

5.1   Country data on competition law:

The data on the year(s) for the first competition law is listed and discussed for each country seperately below. The first year is the "Best Guess" year, and the alternative years are listed in parentheses. A short description of the legal development providing a motivation for years identified is given.

Australia: 1974 (alternative years: 1906 or 1965)
The first competition law was the Australian Industries Preservation Act 1906, modelled on the

U.S. Sherman Act. The 1906 Act appears to have been aimed particularly at foreign trusts, and it was seriously weakened already in 1908 by being declared in part unconstitutional. Some legislation was introduced in 1965, but the Trade Practices Act 1974 is widely considered as providing the first platform for a comprehensive competition policy. (see Merrett, Corones and Round, 2007, Plowman, 1992 and Steinwall, 1999).

Austria: 2002 (alternative year: 1988)
Austrian competition policy was based on an abuse principle until 2002 when a general prohibition of restrictive practices was introduced. (See EC Competition Policy Newsletter 1(4), 1995, and Böheim, 2002.) Earlier legislation was the Cartel Act of 1988 (see OECD, 1999a).

Belgium: 1991 (alternative year: 1960)
In 1991 Belgium passed a competition law similar to the European Union law and national law of other countries (it became effective on the 1 April 1993). Previously to this, competition law was considerably weaker and aimed only against the abuse of market power, i.e., agreements in restraint of competition were not prohibited per se. (See OECD 1997.)

Canada: 1986 (alternative year: 1889)
Canada adopted An Act for the Prevention and Suppression of Combinations Formed in Restraint of Trade in 1889, the so-called Combines Act. However, the Combines Act was largely unenforced and Canada's modern competition policy relies on the Competition Act which was passed in 1986. Even so, the law only prohibits agreements that prevent or lessen competition "unduly", or that enhance prices "unreasonably" (see OECD, 2002a).

Denmark: 1997 (alternative year: 1955)
In Denmark The Monopolies Act of 1955 established a Monopolies Control Council, and gave it some enforcement powers. The Monopolies Act, as well as a law enacted in 1990, was however based on the abuse principle, and a competition law based on prohibition was not enacted until 1997 (see OECD 2000b).

Finland: 2003 (alternative year: 1988)
In Finland, cartels were long not prohibited and price controls were the main tools against abuses. A law adopted in 1988 did not take the step to prohibition but in 2004 Finnish national legislation was harmonised with EC competition rules, in the Regulation 1/2003 implementing Articles 81 and 82 and the Merger Regulation 139/2004. (See OECD 2003a and OECD 2005.)

France: 1953
In France, a 1945 Ordonnance prohibited refusals to deal and price discrimination, and a 1953 decree implementing it added provisions on illegal agreements and established the Technical Committee on Cartel Agreements. The 1953 decree was based on a per se rule and prohibited

"all concerted actions, agreements, express or implied understandings, or coalitions, in whatever form and for whatever reason, which have as their object or may have as their effect restraint of the free exercise of competition by impeding the reduction of costs or prices or by encouraging an artificial increase in prices." (See OECD 2003b and the webpage of the French competition authority Conceil de la Concurrence.)

Germany: 1957

The German Federal Republic passed a Law Against Restraints of Competition in 1957, after extensive debate including the established ordo-liberal position which emphasises the role of competition policy. The Act against Restraints on Competition was passed in 1957 and became effective on 1 January 1958. (See OECD 2004b, Möschel 2001 and Scherer 1997.)

Greece: 1977

Greece adopted the Law 703/1977 on the Control of Monopolies and Oligopolies and the Protection of Free Competition, in 1977. The law was not based on previuos Greek laws or institutions but was part of the programme of preparing for membership in the European Community and was modelled on EU laws (see OECD 2001a).

Iceland: 1993

In Iceland, a Competition Act which prohibits "practices whose effect or aim is to fix prices, divide markets, or lead to a dominant market position" was passed in 1993. (See OECD 1999c.)

Ireland 1991: (alternative year: 1953)

In Ireland, the Restrictive Practices Act of 1953 was aimed towards abuses rather than particular types of conduct. This law was replaced by a new Competition Act in 1991. The new law prohibited restrictive agreements and abuses of dominance and established a new Competition Authority. (See OECD 2001b.)

Italy: 1990

Italy's first competition law was adopted in 1990. (See OECD 2001c.)

Japan: 1970 (alternative year: 1947)

In Japan, cartels were encouraged and even officially sponsored in the pre-WWII era. Competition policy was introduced after WWII during the US occupation with the Antimonopoly Act of 1947. Enforcement of the law was weakened when occuption ended and remained so until the late 1960s (see OECD 1999d and Scherer 1997). Thus we take 1970 as the "best guess" year.

Luxembourg: 2002 (alternative year: 1970)

In Luxembourg, the amended Act of 17 June 1970 on restrictive business practices was replaced in 2002 by a new competition law, modelled on Articles 81 and 82 of the EC Treaty (see OECD 2002d).

Netherlands: 1997 (alternative years: 1958 or 1993)

The Netherlands' competition law passed in 1958, but was unenforced. Price fixing became prohibited in 1993, but the old competition law was still based on an abuse principle and competition law in line with EU law was not introduced until 1997. (See OECD 1998a and 2003c.)

New Zealand: 1986

In New Zealand the first competition law is the Commerce Act of 1986 which prohibits agreements between competitors to substantially lessen competition, and regulates mergers and takeovers. (See Bollard, 1997 and OECD, 1998b.)

Norway: 1960 (alternative year: 1926)

Norway introduced the Law on Control of Restraints of Competition and Price Abuse (Trustloven), already in 1926. This law created a system based on a registration requirement for restrictive agreements and dominant firms, and the possibility of using price-controls against prices that were "undue." Horizontal price fixing and collusive tendering was banned in 1960. (See OECD 2003d.)

Portugal: 1983

In Portugal, the first competition was passed in 1983: Decree-Law 422/83 of December 3, 1983, together with Decree-Law 293/82 of July, 27 1982, which set up the Directorate General for Competition and Prices. (See Cuatrecasas and Gonçalves Pereira, Castelo Branco, 2004)

Spain: 1963

In Spain, the first competition law was adopted in 1963. The law included a prohibition of anticompetitive restraints and abuse of dominance, modelled on Articles 85 and 86 of the Treaty of Rome. (See OECD 2000c.)

Sweden: 1993

In Sweden, the 1953 Restrictive Trade Practices Act was based on the abuse principle and did not prohibit restrictive behaviour. A public cartel register was even maintained for some time. In 1993 this model was replaced by a law modelled on the EC competition regime. (See OECD 2007.)

Switzerland: 1985 (alternative year: 1962)

In Switzerland, a first Cartel Act was passed in 1962. The act created the Cartel Commission but gave it little power: the Commission could only suggest to a cartel to change its behaviour. A revised Cartel Act which gave the Commission some power to act was passed in 1985. (See Neven & Von Ungern-Sternberg, 1997 and OECD, 2006.)

Turkey: 1994

In Turkey, competition law was developed in connection with negotiations to enter a customs union with the EU. The Act on the Protection of Competition that was adopted at the end of 1994 takes articles 81 and 82 of the EU treaty as its basis. (See OECD 2002b.)

UK: 1956 (alternative year: 1948)

The UK passed legislation that established the Monopolies and Restrictive Practices Commission in 1948, but the Commission's enforcement powers were initially weak and it could not prohibit cartel agreements until 1956. (See OECD 2002c and Scherer 1997.)

US: 1890

The Sherman Antitrust Act was passed in 1890.

Web appendix:

5.2 Regressions

Here we present the regressions that are summarized in Tables 1, 2 and 3. With 24 observations of the dependent variable it seems desirable to run regressions with only a few explanatory and control variables at one time. Thus we present a number of regressions that vary in the selection of regressors. We use the "Best Guess" year as our main measure of the year of introducing competition policy, and present different sets of regressions for the alternative measure (Early-Law). Our main measure of country size is GDP, and we present regressions replacing it with population. In some additional regressions we measure population at the time of introduction of the competition policy. Two different years are used for the explanatory/control variables (1970 and 1990), with 1990 as the main year due to availability of indexes on corruption, economic freedom etc. We also investigate imposing time-limits on the dependent variable (post-1945 or pre-1991). Statistical significance is indicated with *** for the one percent level, ** for the five percent level and * for the ten percent level.

Table A1. Dependent variable: BestGuessLaw. Regressors GDP1970 combined with Export share in GDP in 1970, Import share in GDP in 1970, Government share in GDP in 1970 and Per capita GDP in 1970. N=24.

#	constant	GDP1970	Xsh1970	Msh1970	Govsh1970	PCapGDP1970	R^2 adj
1	1985.7***	-0.030***	0.170	-	-	-	0.72
2	1987.6***	-0.030***	-	0.122	-	-	0.71
3	1986.6***	-0.032***	-	-	0.290	-	0.71
4	1985.6***	-0.032***	-	-	-	0.436	0.71
5	1983.6***	-0.032***	1.275	-1.305	0.597	-0.401	0.71

Table A2. Dependent variable: BestGuessLaw. Regressors: GDP1990 combined with Export share in GDP in 1990, Import share in GDP in 1990, Government share in GDP in 1990 and Per capita GDP in 1990. N=24.

#	constant	GDP1990	Xsh1990	Msh1990	Govsh1990	PCapGDP1990	R^2 adj
6	1984.4***	-0.015***	0.153	-	-	-	0.68
7	1984.4***	-0.015***	-	0.157	-	-	0.67
8	1989.7***	-0.016***	-	-	0.025	-	0.66
9	1982.2***	-0.016***	-	-	-	0.410	0.68
10	1991.9***	-0.016***	0.583	-0.574	-0.401	0.267	0.64

Table A3. Dependent variable: BestGuessLaw. Regressors: GDP1990 combined with Gini coefficients for a year between 1987 and 1995, Corruption in 1996, The Heritage foundation freedom index for 1996 and the OECD Product market regulation indicator for 1998. N=23 (24 in #12).

#	constant	GDP1990	Gini	Corrup	Heritage	PMR	R^2 adj
11	2013.6***	-0.016***	-0.751	-	-	-	0.68
12	1993.2***	-0.016***	-	-0.378	-	-	0.66
13	1992.3***	-0.016***	-	-	-0.034	-	0.65
14	1983.1***	-0.015***	-	-	-	3.072	0.66
15	1961.3***	-0.017***	-1.424*	-2.718	1.321	3.233	0.66

Table A4. Dependent variable: EarliestLaw. Regressors GDP1970 combined with Export share in GDP in 1970, Import share in GDP in 1970, Government share in GDP in 1970 and Per capita GDP in 1970. N=24.

#	constant	GDP1970	Xsh1970	Msh1970	Govsh1970	PCapGDP1970	R^2 adj
16	1971.8***	-0.025**	-0.105	-	-	-	0.20
17	1973.0***	-0.025**	-	-0.158	-	-	0.20
18	1998.2***	-0.022**	-	-	-1.961	-	0.25
19	1979.4***	-0.023**	-	-	-	-0.876	0.21
20	2001.7***	-0.022**	0.735	-0.855	-1.419	-0.880	0.15

Table A5. Dependent variable: EarliestLaw. Regressors: GDP1990 combined with Export share in GDP in 1990, Import share in GDP in 1990, Government share in GDP in 1990 and Per capita GDP in 1990. N=24.

#	constant	GDP1990	Xsh1990	Msh1990	Govsh1990	PCapGDP1990	R^2 adj
21	1972.8	-0.013**	-0.121	-	-	-	0.19
22	1971.3	-0.013**	-	-0.082	-	-	0.19
23	1996.1	-0.013***	-	-	-1.428	-	0.22
24	1977.6	-0.012**	-	-	-	-0.482	0.20
25	1979.6	-0.012**	-1.770	2.005	-1.391	-0.450	0.13

Table A6. Dependent variable: EarliestLaw. Regressors: GDP1990 combined with Gini coefficients for a year between 1987 and 1995, Corruption in 1996, The Heritage foundation freedom index for 1996 and the OECD Product market regulation indicator for 1998. N=23 (24 in #27).

#	constant	GDP1990	Gini	Corrup	Heritage	PMR	R^2 adj
26	1955.9***	-0.012**	0.347	-	-	-	0.18
27	1997.2***	-0.012***	-	-3.652*	-	-	0.29
28	2083.5***	-0.009*	-	-	-1.747*	-	0.29
29	1915.3***	-0.010**	-	-	-	25.417**	0.40
30	1901.3***	-0.070	1.166	4.166	-1.160	34.496*	0.37

Table A7. Dependent variable: BestGuessLaw. Regressors: Population in 1970 combined with Export share in GDP in 1970, Import share in GDP in 1970, Government share in GDP in 1970 and Per capita GDP in 1970. N=24.

#	constant	pop1970	Xsh1970	Msh1970	Govsh1970	PCapGDP1970	R^2 adj
31	1989.2***	-0.421***	0.101	-	-	-	0.69
32	1991.1***	-0.433***	-	0.044	-	-	0.68
33	1995.0***	-0.439***	-	-	-0.171	-	0.68
34	1992.9***	-0.440***	-	-	-	-0.039	0.68
35	1994.6***	-0.426***	1.414*	-1.501	0.410	-0.857	0.69

Table A8. Dependent variable: BestGuessLaw. Regressors: Population in 1990 combined with Export share in GDP in 1990, Import share in GDP in 1990, Government share in GDP in 1990 and Per capita GDP in 1990. N=24.

#	constant	pop1990	Xsh1990	Msh1990	Govsh1990	PCapGDP1990	R^2 adj
36	1988.2***	-0.347***	0.095	-	-	-	0.67
37	1988.2***	-0.348***	-	0.097	-	-	0.67
38	2000.5***	-0.372***	-	-	-0.437	-	0.67
39	1991.4***	-0.364***	-	-	-	0.026	0.67
40	2005.2***	-0.367***	0.750	-0.791	-0.510	-0.130	0.63

Table A9. Dependent variable: BestGuessLaw. Regressors: Population in 1990 combined with Gini coefficients for a year between 1987 and 1995, Corruption in 1996, The Heritage foundation freedom index for 1996 and the OECD Product market regulation indicator for 1998. N=23 (24 in #42).

#	constant	pop1990	Gini	Corrup	Heritage	PMR	R^2 adj
41	2003.2***	-0.357***	-0.368	-	-	-	0.67
42	2005.1***	-0.376***	-	-1.612	-	-	0.70
43	2016.4***	-0.354***	-	-	-0.366	-	0.67
44	1978.2***	-0.351***	-	-	-	6.372	0.68
45	1984.0***	-0.399***	-1.067	-3.847	1.069	0.671	0.67

Table A10. Dependent variable: BestGuessLaw. Time limit: the Best Guess year is after 1945. Regressors: GDP1990 combined with Export share in GDP in 1990, Import share in GDP in 1990, Government share in GDP in 1990 and Per capita GDP in 1990. N=23.

#	constant	GDP1990	Xsh1990	Msh1990	Govsh1990	PCapGDP1990	R^2 adj
46	1980.5***	-0.009**	0.204	-	-	-	0.27
47	1979.7***	-0.009*	-	0.228	-	-	0.26
48	1986.7***	-0.012**	-	-	0.090	-	0.21
49	1981.2***	-0.012***	-	-	-	0.380	0.24
50	1985.2***	-0.011*	0.487	-0.386	-0.227	0.174	0.16

Table A11. Dependent variable: BestGuessLaw. Time limit: the Best Guess year is after 1945. Regressors: GDP1990 combined with Gini coefficients for a year between 1987 and 1995,

Corruption in 1996, The Heritage foundation freedom index for 1996 and the OECD Product market regulation indicator for 1998. N=22 (23 in #52).

#	constant	GDP1990	Gini	Corrup	Heritage	PMR	R^2 adj
51	2007.9***	-0.012***	-0.612	-	-	-	0.24
52	1990.3***	-0.012**	-	-0.215	-	-	0.21
53	1987.8***	-0.012**	-	-	-0.006	-	0.19
54	1984.1***	-0.011**	-	-	-	1.713	0.19
55	1964.2***	-0.016**	-1.313	-2.504	1.204	2.857	0.12

Table A12. Dependent variable: EarliestLaw. Time limit: the EarliestLaw year is after 1945. Regressors: GDP1990 combined with Export share in GDP in 1990, Import share in GDP in 1990, Government share in GDP in 1990 and Per capita GDP in 1990. N=20.

#	constant	GDP1990	Xsh1990	Msh1990	Govsh1990	PCapGDP1990	R^2 adj
56	1989.3***	-0.015***	-0.314*	-	-	-	0.30
57	1993.6***	-0.016***	-	-0.427**	-	-	0.33
58	1981.6***	-0.011**	-	-	-0.266	-	0.15
59	1980.7***	-0.010**	-	-	-	-0.229	0.15
60	2008.6***	-0.018***	0.934	-1.561	-0.296	-0.103	0.22

Table A13. Dependent variable: EarliestLaw. Time limit: the EarliestLaw year is after 1945. Regressors: GDP1990 combined with Gini coefficients for a year between 1987 and 1995, Corruption in 1996, The Heritage foundation freedom index for 1996 and the OECD Product market regulation indicator for 1998. N=19 (20 in #62, 18 in #65).

#	constant	GDP1990	Gini	Corrup	Heritage	PMR	R^2 adj
61	1968.0***	-0.010*	0.220	-	-	-	0.12
62	1993.2***	-0.011**	-	-2.138*	-	-	0.28
63	2042.3***	-0.009*	-	-	-1.009*	-	0.27
64	1955.2***	-0.011**	-	-	-	10.230	0.26
65	1955.2***	-0.009	0.440	0.562	-0.821	7.725	0.14

Table A14. Dependent variable: BestGuessLaw. Time limit: the Best Guess year is before 1991. Regressors: GDP1990 combined with Export share in GDP in 1990, Import share in GDP in 1990, Government share in GDP in 1990 and Per capita GDP in 1990. N=14.

#	constant	GDP1990	Xsh1990	Msh1990	Govsh1990	PCapGDP1990	R^2 adj
66	1994.5***	-0.015***	-0.481	-	-	-	0.64
67	2003.3***	-0.016***	-	-0.771	-	-	0.66
68	2009.0***	-0.014***	-	-	-1.475	-	0.66
69	1978.2***	-0.014***	-	-	-	0.177	0.62
70	2043.8***	-0.017***	0.819	-1.631	-2.023	-0.024	0.61

Table A15. Dependent variable: BestGuessLaw. Time limit: the Best Guess year is before

1991. Regressors: GDP1990 combined with Gini coefficients for a year between 1987 and 1995, Corruption in 1996, The Heritage foundation freedom index for 1996 and the OECD Product market regulation indicator for 1998. N=14.

#	constant	GDP1990	Gini	Corrup	Heritage	PMR	R^2 adj
71	1994.4***	-0.013***	-0.390	-	-	-	0.63
72	1997.2***	-0.013***	-	-2.008	-	-	0.65
73	1972.3***	-0.014***	-	-	0.135	-	0.62
74	1970.9***	-0.013***	-	-	-	5.012	0.64
75	1879.0***	-0.017***	-1.052	-6.660*	2.632*	5.547	0.71

Table A16. Dependent variable: EarliestLaw. Time limit: the EarliestLaw year is before 1991. Regressors: GDP1990 combined with Export share in GDP in 1990, Import share in GDP in 1990, Government share in GDP in 1990 and Per capita GDP in 1990. N=21.

#	constant	GDP1990	Xsh1990	Msh1990	Govsh1990	PCapGDP1990	R^2 adj
76	1963.3***	-0.011**	-0.001	-	-	-	0.15
77	1960.5***	-0.010*	-	-0.072	-	-	0.15
78	2008.4***	-0.012**	-	-	-2.314	-	0.22
79	1974.1***	-0.010**	-	-	-	-0.546	0.17
80	1986.9***	-0.011*	-1.418	1.737	-1.943	0.196	0.09

Table A17. Dependent variable: EarliestLaw. Time limit: the EarliestLaw year is before 1991. Regressors: GDP1990 combined with Gini coefficients for a year between 1987 and 1995, Corruption in 1996, The Heritage foundation freedom index for 1996 and the OECD Product market regulation indicator for 1998. N=21 (20 in #84 and #85).

#	constant	GDP1990	Gini	Corrup	Heritage	PMR	R^2 adj
81	1956.3***	-0.011**	0.225	-	-	-	0.15
82	2001.9***	-0.012**	-	-4.581	-	-	0.24
83	2052.9***	-0.009*	-	-	-1.321	-	0.22
84	1903.1***	-0.008*	-	-	-	29.344**	0.41
85	1849.3***	-0.008	1.132	2.215	-0.211	36.154**	0.33

Table A18. Dependent variable: BestGuessLaw Regressors: population in the Best Guess year and population relative to the US population in the Best Guess year. N=24.

#	constant	population in BG year	population rel. to US pop in BG year	R^2 adj
86	1990.3***	-0.462**	-	0.23
87	1992.4***	-	-92.080***	0.70

Table A19. Dependent variable: BestGuessLaw. Time limit: the BestGuessLaw year is after 1945. Regressors: population in the Best Guess year and population relative to the US population in the Best Guess year. N=23.

Country	BestGuess Law	Earliest Law	GDP1970	GDP1990	pop1970	pop1990	Xshare 1970	Xshare 1990	Mshare 1970	Mshare 1990
Australia	1974	1906	171.035	310.588	12.728	16.888	13	17	12.1	16.4
Austria	2002	1988	89.634	161.692	7.467	7.729	30	40	23.3	36.8
Belgium	1991	1960	116.001	197.174	9.656	9.967	52	71	46.7	67.5
Canada	1986	1889	291.167	574.204	21.717	27.700	23	26	18.0	25.7
Denmark	1997	1955	94.341	133.361	4.929	5.140	27	36	21.1	32.6
Finland	2003	1988	69.620	136.969	4.606	4.986	24	23	20.4	23.9
France	1953	1953	687.734	1215.893	50.772	56.735	15	21	14.3	22.6
Germany	1957	1957	1013.224	1671.312	78.169	79.431	16	25	16.7	24.9
Greece	1977	1977	50.089	84.074	8.793	10.160	10	18	14.2	29.6
Iceland	1993	1993	2.569	6.225	.204	.255	44	34	33.7	32.3
Ireland	1991	1953	20.866	47.301	2.954	3.515	34	57	38.1	51.8
Italy	1990	1990	618.102	1102.438	53.822	56.719	16	20	13.1	19.0
Japan	1970	1947	1321.211	3053.144	104.331	123.539	11	10	6.7	9.5
Luxemb	2002	1970	5.294	11.081	.339	.378	94	104	79.4	88.2
Netherl	1997	1958	177.179	294.758	13.039	14.952	44	54	40.6	52.6
NewZeal	1986	1986	30.429	43.618	2.820	3.360	22	27	18.8	26.6
Norway	1960	1926	56.152	116.107	3.877	4.242	37	40	40.3	33.8
Portugal	1983	1983	32.659	71.466	8.68	9.898	22	33	26.4	37.9
Spain	1963	1963	267.469	509.967	33.779	39.304	13	16	8.6	19.4
Sweden	1993	1993	159.253	240.153	8.043	8.559	24	30	24.6	30.0
Switzerl	1985	1962	164.718	228.415	6.187	6.834	31	36	19.7	34.7
Turkey	1994	1994	60.872	150.676	36.207	57.598	4	13	7.6	17.6
UK	1956	1948	627.973	989.564	54.832	56.760	22	24	16.8	26.4
US	1890	1890	3055.099	5750.800	210.111	255.716	6	10	7.3	10.9

#	constant	population in BG year	population rel. to US pop in BG year	R^2 adj
88	1989.1***	-0.277**	-	0.17
89	1990.4***	-	-68.990***	0.31

Table A20. Dependent variable: BestGuessLaw. Time limit: the BestGuessLaw year is before 1991. Regressors: population in the Best Guess year and population relative to the US population in the Best Guess year. N=14.

#	constant	population in BG year	population rel. to US pop in BG year	R^2 adj
90	1977.8***	-0.337	-	0.8
91	1984.3***	-	-80.480***	0.70

5.3 Data supplement

The data used to produce the regressions above, Figures 1 and 2 and Tables A1 through A20 is given below in Figures 5 and 6.

6 Appendix B: applying the destination principle

As in section 3, we first show that large countries have a stronger incentive to start implementing competition policy than small countries. Hence, we ask under what conditions a country (here country H) would unilaterally want to start preventing firms from colluding. The point of

Govsh 1970	Govsh 1990	Per cap GDP1970	Per cap GDP1990	Gini	Corrup	Heritage	Prod Mkt Reg	pop BGyear	USpop Bgyear	poprelUS Bgyear
14	19	13.4377	18.39105	33.5	8.98	74.0	1.523838	13.599	213.854	.0635901
15	19	12.00402	20.92017	31.42	8.85	68.9	2.33	8.033	278.06	.0288894
18	20	12.01336	19.78268	25.74	7.4	66.0	2.17497	9.979	252.643	.0394984
21	23	13.40733	20.72939	30.98	8.73	70.3	1.285605	25.309	241.625	.104745
21	26	19.13999	25.94572	24.79	9.83	67.3	1.589266	5.284	267.636	.0197432
15	22	15.11507	27.47072	22.97	9.78	63.7	2.078239	5.2	278.07	.0187003
17	22	13.54554	21.43109	32.75	7.68	63.7	2.521922	42.668	159.565	.267402
17	20	12.96197	21.04105	28.98	8.94	69.1	2.05698	53.649	171.274	.3132349
11	15	5.696463	8.275	32.7	3.62	60.5	2.903518	9.309	220.239	.0422677
13	20	12.59314	24.41176		7.28		1.686185	.265	258.12	.0010267
16	16	7.063643	13.4569	36.11	8.69	68.5	1.649907	3.526	252.643	.0139565
16	20	11.48419	19.43684	32.57	4.38	60.8	2.593958	56.763	248.71	.2282297
10	13	12.66365	24.71401	24.9	6.49	72.6	2.188025	103.72	203.212	.5104029
12	18	15.61652	29.31482	26.79	9.19	72.5		.44	278.065	.0015824
20	23	13.58839	19.71362	31.52	10.22	69.7	1.661224	15.567	267.636	.0581648
16	19	10.79043	12.98155	43.9	10.37	78.1	1.360066	3.263	241.625	.0135044
16	21	14.48336	27.37082	25.23	9.93	65.4	1.850743	3.568	179.323	.0198971
13	16	3.762558	7.220247	35.6	6.98	64.5	2.250715	9.955	234.799	.042398
10	17	7.918204	12.97494	32.43	5.81	59.6	2.549618	31.723	189.242	.1676319
22	27	19.8002	28.05853	25.05	9.68	61.8	1.933495	8.745	258.12	.0338796
10	14	26.62324	33.42332	35.96	10.26	76.8	2.475731	6.485	239.279	.0271023
9	11	1.681222	2.615993	41.5	-0.99	56.7	3.300667	59.706	260.529	.2291722
18	20	11.45267	17.43418	36.12	9.13	76.4	1.0698	51.406	168.221	.3055861
18	17	14.54041	22.48901	37.41	8.63	76.7	1.282778	62.975	62.975	1.0

departure is a world without competition policy. We define competition policy, which is taken to be the same thing as anti-trust policy, as follows.

DEFINITION 2 *When a country has a national competition policy, all firms producing for that country make independent decisions about the quantities sold.*

Hence, if country H unilaterally implements a competition policy, all quantities sold in H are chosen independently, while all quantities sold in F are determined collusively. If neither country has a competition policy, all quantities are determined collusively. Let us begin by studying the latter scenario. Colluding firms are asymmetric in the sense that firms producing for the local market face zero trade costs. Obviously, this is not true for exporting firms. This, in turn, means that the choice of objective function is to some extent arbitrary. Assuming joint profit maximisation and side payments, imports would simply drop to zero. To avoid this extreme outcome, we assume that side payments are not possible and that firms maximise joint profits subject to the constraint that markets shares are held fixed at the competitive levels. Thus, under collusion, all quantities are reduced relative to competitive levels by a common factor $z < 1$. This implies the following quantities:

$$Q_1^H = Q_2^H = z \frac{\ell^H(\alpha + 2\tau)}{5} \tag{45}$$

$$Q_3^H = Q_4^H = z \frac{\ell^H(\alpha - 3\tau)}{5} \tag{46}$$

$$Q_1^F = Q_2^F = z\frac{\ell^F(\alpha - 3\tau)}{5} \tag{47}$$

$$Q_3^F = Q_4^F = z\frac{\ell^F(\alpha + 2\tau)}{5} \tag{48}$$

where the joint profit maximising level of z is

$$z^* = \frac{5(2\alpha^2 - 2\alpha\tau + 3\tau^2)}{4(2\alpha - \tau)^2}. \tag{49}$$

It can easily be checked that z^* is increasing in τ and that $z^* \in [\frac{5}{8}, \frac{3}{4}]$ for $\tau \in [0, \bar{\tau}]$. Letting $z = z^*$ joint profits equal

$$\pi_1 + \pi_2 = \frac{(2\alpha^2 - 2\alpha\tau + 3\tau^2)(\ell^H(\alpha + 2\tau)(2\alpha^2 - 3\tau^2) + \ell^F(\alpha - 3\tau)(2\alpha^2 - 4\alpha\tau - \tau^2))}{4(2\alpha - \tau)^3} - 2\sigma f, \tag{50}$$

where $\sigma < 1$ measures the strength of synergies in fixed costs. The consumer surplus is

$$U^H = m + \frac{(2\alpha^2 - 2\alpha\tau + 3\tau^2)^2}{8(2\alpha - \tau)^2}. \tag{51}$$

Hence, aggregate welfare becomes

$$W^H = \pi_1 + \pi_2 + \ell^H U^H \tag{52}$$

where profits and consumer surplus are defined as above.

The welfare in (52) may be compared to a situation where country H unilaterally introduces competition policy. If a competition policy is implemented in country H, Q_1^H and Q_2^H as well as Q_3^H and Q_4^H are chosen independently while firms maximise joint profits in country F keeping market shares at the competitive levels. The corresponding Nash equilibrium quantities are the same as above except that in (45) and (46) $z = 1$ instead of z^*. This implies the following set of welfare measures:

$$\tilde{\pi}_1 + \tilde{\pi}_2 = \frac{8\ell^H(\alpha + 2\tau)^2(2\alpha - \tau)^3 + 25\ell^F(\alpha - 3\tau)(2\alpha^2 - 4\alpha\tau - \tau^2)(2\alpha^2 - 2\alpha\tau + 3\tau^2)}{100(2\alpha - \tau)^3} - 2f \tag{53}$$

$$\tilde{U}^H = m + \frac{2(2\alpha - \tau)^2}{25} \tag{54}$$

$$\tilde{W}^H = \tilde{\pi}_1 + \tilde{\pi}_2 + \ell^H \tilde{U}^H. \tag{55}$$

Now, under the assumption that F does not adopt a competition policy, define Δ^H as the difference between aggregate welfare in H with and without competition policy:

$$\Delta^H \equiv \widetilde{W}^H - W^H = \frac{\ell^H (6\alpha^2 - 6\alpha\tau - 11\tau^2)(8\alpha^3 - 14\alpha^2\tau + 18\alpha\tau^2 - 19\tau^3)}{40(2\alpha - \tau)^3} - 2f(1 - \sigma). \quad (56)$$

It can be checked that the first part of (56) is always positive. This leads us to Propositions 5 and 6.

PROPOSITION 5 *Large countries have relatively stronger incentives to adopt a competition policy.*

Proof: The statement follows from the fact that $\frac{\partial \Delta^H}{\partial \ell^H} > 0$.

PROPOSITION 6 *The benefit of adopting a competition policy is decreasing in τ.*

Proof: From (56)

$$\frac{\partial \Delta^H}{\partial \tau} = -\frac{\ell^H (60\alpha^5 - 76\alpha^4\tau + 152\alpha^3\tau^2 + 336\alpha^2\tau^3 - 1087\alpha\tau^4 + 209\tau^5)}{20(2\alpha - \tau)^4} < 0 \quad \text{for } \tau \in [0, \bar{\tau}].$$

The next question is the following. Given that a large country H has adopted a competition policy, when will a smaller country F want to do the same? In order to answer this question we first calculate welfare measures for the case when both countries have adopted competition policies. Then we calculate the welfare in F when only H has adopted a competition policy. Finally, the welfare gains for country F from introducing a competition policy are discussed.

When both countries have a national competition policy, output decisions are made independently. The corresponding Nash equilibrium quantities are given by (45)-(48) letting $z = 1$. This implies the following set of welfare measures:

$$\tilde{\pi}_3 + \tilde{\pi}_4 = \frac{2 \left[\ell^H (\alpha - 3\tau)^2 + \ell^F (\alpha + 2\tau)^2 \right]}{25} - 2f \quad (57)$$

$$\tilde{U}^F = m + \frac{2(2\alpha - \tau)^2}{25} \quad (58)$$

$$\widetilde{W}^F = \tilde{\pi}_3 + \tilde{\pi}_4 + \ell^F \tilde{U}^F. \quad (59)$$

In the case discussed above, where only country H adopts a competition policy, the corresponding profit and welfare measures in country F are:

$$\pi_3 + \pi_4 = \frac{8\ell^H (\alpha - 3\tau)^2 (2\alpha - \tau)^3 + 25\ell^F (\alpha + 2\tau)(4\alpha^4 - 4\alpha^3\tau + 6\alpha\tau^3 - 9\tau^4)}{100(2\alpha - \tau)^3} - \sigma f \quad (60)$$

$$U^F = m + \frac{(2\alpha^2 - 2\alpha\tau + 3\tau^2)^2}{8(2\alpha - \tau)^2} \tag{61}$$

$$W^F = \pi_3 + \pi_4 + \ell^F U^F \tag{62}$$

Now, under the assumption that H adopts a competition policy, define Δ^F as the difference between aggregate welfare in F with and without competition policy. Then,

$$\Delta^F \equiv \widetilde{W}^F - W^F = \frac{\ell^F (6\alpha^2 - 6\alpha\tau - 11\tau^2)(8\alpha^3 - 14\alpha^2\tau + 18\alpha\tau^2 - 19\tau^3)}{40(2\alpha - \tau)^3} - 2f(1-\sigma). \tag{63}$$

This leads us to Propositions 7 and 8.

PROPOSITION 7 *The larger the population in the small country, the stronger its incentives to follow the large country in adopting a competition policy.*

Proof: The statement follows from the fact that $\frac{\partial \Delta^F}{\partial \ell^F} > 0$.

PROPOSITION 8 *The benefit of adopting a competition policy once the large country has done so is decreasing in the level of trade costs.*

Proof:

$$\frac{\partial \Delta^F}{\partial \tau} = -\frac{\ell^F (60\alpha^5 - 76\alpha^4\tau + 152\alpha^3\tau^2 + 336\alpha^2\tau^3 - 1087\alpha\tau^4 + 209\tau^5)}{20(2\alpha - \tau)^4} < 0 \quad \text{for } \tau \in [0, \bar{\tau}].$$

In sum, applying a destination principle generates results that are consistent with observed empirical regularities as well with the main theoretical results obtained in section 3 that were based on the origin principle. Larger countries have stronger incentives to unilaterally implement a competition policy. At the same time, the benefit of adopting a competition policy once the large country has done so is decreasing in the level of trade costs. Hence, given that there are implementation costs, trade costs have to be reduced a lot for small countries to follow. The intuition for the first result is basically the same as before. A large country has more consumers and therefore cares more about the consumer surplus, which always increases as competition policy is introduced. The intuition for the second result is somewhat different in this alternative setting. For countries that are small in terms of population, firm profits have a relatively large welfare weight. As trade costs are reduced, foreign firms capture a larger fraction of the collusive profits. Hence, the loss of adopting a competition policy, in terms of firm profits, is reduced as trade costs go down. Moreover, since lower trade costs make import competition fiercer when

firms are *not* colluding, the effect on domestic consumer prices from adopting a competition policy is larger the lower the trade cost. This means that the gain in terms of consumer surplus is largest at low trade costs.