

BoF Online

4 • 2015

**The degree of product
market regulation in Finland
and estimated effects of
reform**

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The opinions expressed in this paper are those of the authors and do not necessarily reflect the views of the Bank of Finland.



Bank of Finland

Monetary Policy and Research

16.4.2015

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BoF Online
Editor-in-Chief

Jenni Hellström

ISSN

1796-9123 (online)

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1 Introduction

The prolonged slowdown in real growth, recently experienced by many advanced European countries including Finland, raises the possibility that the underlying causes are structural in nature. If this is indeed the case, an overhaul of both product and labor market structures may be required to return the economy to previous growth trajectories. The objective of this note is twofold: (i) to provide an overview of the current level of product market regulation in various sectors of the Finnish economy, and (ii) to provide a quantitative assessment of the potential productivity gains that can be expected from pro-competitive product market reform in Finland, based on existing empirical evidence.

Finland made rapid progress on product market reforms during the 1990's, but the phase of reform has slowed down in more recent periods. Currently, Finnish anti-competitive product market regulation is generally close to the EU average. However, regulation in certain non-manufacturing sectors, such as retail trade and air transport, is still high. Hence, it is in sectors such as these that the largest potential productivity gains from deregulation can be made.

The efficiency gains from past and potential future product market reforms are likely to be large. For instance, based on a simple back-of-the-envelope calculation, which draws on past empirical evidence, I estimate the productivity gains from Finnish product market reforms in the years between 1998 and 2008 to be about 20.7% over the long-run (more than 40 years) and about 6.7% over the last five years. Potential future reforms are likely to deliver equally large benefits. Nevertheless, the uncertainty surrounding these estimates is large.

The rest of the note is organized as follows. Next section, discusses the empirical literature on the relationship between product market regulation, competition and efficiency. Section 3 introduces a comprehensive indicator of product market regulation – the OECD PMR indicator – which underlies most past empirical results, and Section 4 provides an overview of the state of Finnish product market regulations in light of this indicator. Section 5 conducts back-of-the-envelope calculations of the possible productivity gains to product market reform in Finland. Section 6 concludes.

2 Deregulation, competition and efficiency in the literature

The relationship between product market competition and efficiency has always been at the heart of economics. Economic theory generally predicts that increases in competition leads to more efficient outcomes. Increases in competition are, thus, generally welfare enhancing, although the relationship may not be straightforward in markets that are subject to various frictions. In light of the importance of this topic, it is hardly surprising that a number of empirical studies attempt to verify this relationship in the data.¹ The stylized facts that emerge from this literature tend to be in line with the predictions of theory: increased competition reduces markups, lowers prices, and increases productivity.

Given that a fairly strong case can be made for the beneficial effects of competition, measures aimed at fostering a more competitive environment are of considerable interest for public policy.² More often than not, such measures entail dismantling regulation that stand in the way of competition in markets *where competition is fully viable*. Concrete examples of such regulation, include trade licenses, tariffs, legal barriers to entry, public sector dominance and so on. However, in some markets, where various frictions or externalities reduce the scope for competition, *increased regulation* may lead to more competitive and efficient outcomes. For example, it is well known that regulation that reduce network externalities or limit rents extracted by natural monopolies can have such effects.

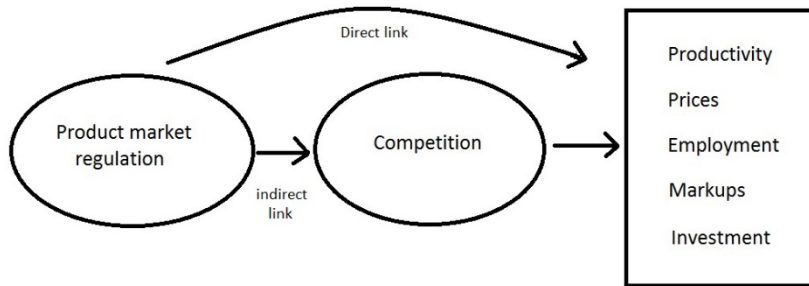
Linking competition to efficiency is, however, not sufficient for a quantitative assessment of the benefits of competition-enhancing measures. Making such assessments also requires linking the policy measures to competition or, alternatively, directly to measures of efficiency (see Chart 1). And to do so at a more general level raises a difficult question: how should we compare different competition-enhancing policy measures across industries? For example, is reducing import-tariffs a big reform compared to abolishing licenses for taxi drivers? Due to this difficulty, some studies have focused instances of deregulation in specific industries to

¹ See eg Nickell (1996), Nickell et al (1997), Blundell, Griffith, and van Reenen (1999), Aghion and Griffith (2005) and Crafts (2006) and references therein.

² The effects of (de)regulation are not straightforward theoretically as it has distributional implications (eg Blanchard and Giavazzi (2003)). Too much competition may also reduce growth, in theory, if for example firms lose the incentive to innovate due to low rents. On the other hand, firms may also choose to innovate to generate market power. For a comprehensive discussion, see Aghion and Griffith (2005).

be able to quantify their effects on productivity.³ While these studies reassuringly find strong productivity enhancing effects of deregulation, the results cannot easily be generalized beyond the specific reforms and industries considered.

Chart 1. Product market regulation, competition, and measures of efficiency



The means for quantifying the effects of deregulation at a more general level has recently been provided by the OECD that constructs indicators of product market regulation at the industry and country level.⁴ While these indicators are far from perfect, they nevertheless have spurred a number of interesting studies. A seminal contribution is provided by Nicoletti and Scarpetta (2003) who study the effects of the indicators on total factor productivity in 23 industries for 18 OECD countries over the period 1984–1998. They find that product market deregulation significantly increases productivity, in both economic and statistical terms.

Following in the footsteps of Nicoletti and Scarpetta, several subsequent studies have refined the results further. Conway et al (2006), for instance, control for technological convergence and find that product market deregulation is more beneficial in industries that are further away from the technological frontier. Kent and Simon (2007) control for interactions between product and labor market deregulation and find that these are predominantly complementary in nature so that joint deregulation yield the highest benefits in terms of productivity. Firm-level evidence is provided by Arnold et al (2011), while Barone and Cingano (2011) focus on the service sector in particular. The effect on labor productivity is studied by Bouis et al (2011). All find sizable productivity enhancing effects of product

³ Recent studies include Schmitz (2005), Symeonidis (2008) and Friebe et al (2010).

⁴ Alternative indicators that aim to quantify aspects of the business environment, including regulation, are provided by the World Bank (World Bank 'doing Business', <http://www.doingbusiness.org/>). Dall'Olio et al (2014) study the effects of changes in these indicators on labor productivity growth at the firm level. They find sizable productivity gains from deregulation.

market reform. Bourles et al (2013) go one step further and allow for ‘trickle-down’ effects from deregulation in industries covered by the OECD indicators to all industries. As such, they find more sizable effects. Finally, attempting to uncover the underlying channels for the productivity-enhancing effects of deregulation, Griffith et al (2010) find a positive effect on R&D and Alesina et al (2005) similarly on investments.

Some studies have also investigated the effects of product market regulation on employment (eg Berger and Danniger (2006), Fiori et al (2012) and Amable et al (2015)) or unemployment and wages (Griffith et al (2007)). These studies find positive and significant employment effects of product market deregulation. In addition, product market deregulation has the largest impact on employment when labor market regulation is high.

Taken together, these studies provide a reasonably unified picture of the effects of product market reforms. In short, product market reforms tend to generate long-lasting and sizable increases in productivity. The biggest benefits are obtained for industries that are initially heavily regulated and/or far from the technological frontier.

3 Measuring the degree of product market regulation

The OECD Indicators of Product Market Regulation arguably provide the most comprehensive summary information on regulation in product markets that is available across countries and time.⁵ Due to their wide country and time coverage, the indicators underlie the vast majority of recent empirical studies that aim to quantify the effects of product market deregulation on, for instance, productivity or employment. For this reason, this note will draw upon this indicator to make a quantitative assessment of the current state of product market regulation in Finland, as well as of the potential benefits from deregulation. To facilitate the interpretation later on, this section provides an overview to the PMR and its various sub-indicators.

The OECD indicators summarize various pieces of information on regulations, such as the extent of government interference in markets and various barriers to entry or trade, that curb efficiency-enhancing competition *where competition is viable*. As the last qualifier suggest,

⁵ Full descriptions can be found in Conway and Nicoletti (2006) and Wöfl et al (2009). The indicators are publically available at: <http://www.oecd.org/economy/growth/indicatorsofproductmarketregulationhomepage.htm>

they do not incorporate data on regulation in areas in which competition would lead to *inefficient* outcomes. This is an important distinction: by this metric, data on regulation that aims to reduce network externalities, say, are ignored. Hence, the correct interpretation of the indicators is that it aims to capture *anti-competitive* regulation rather than regulation in general. In particular, it is silent about competition enhancing regulation.

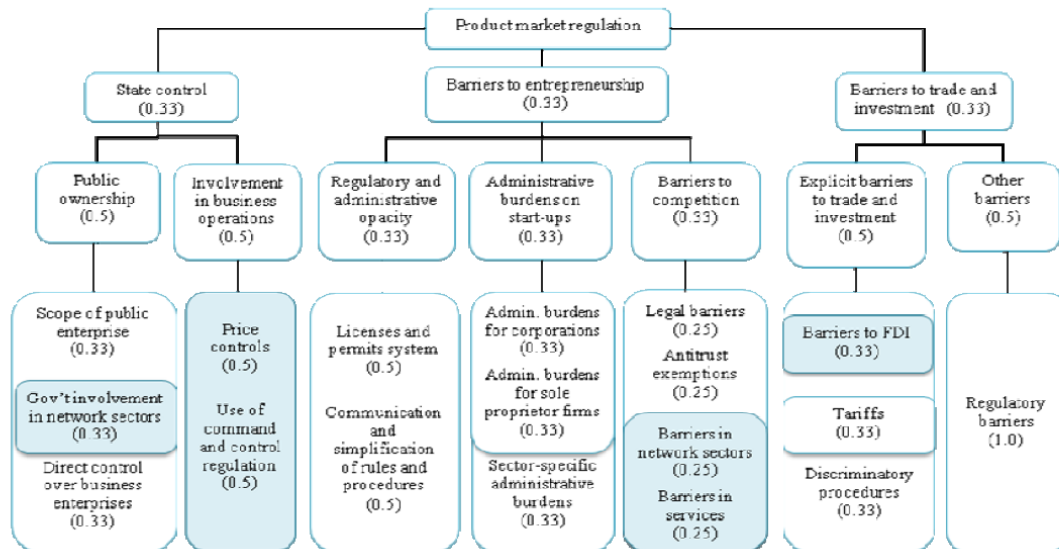
3.1 The Product Market Regulation indicator

The PMR aggregates two-digit ISIC sector data on product market regulations from the OECD Regulatory Indicators Questionnaire to 34 member states (conducted 1998, 2003, 2008 and 2013), as well as data from the European Commission, national governments and regulatory agencies. The aggregation follows a pyramid structure (see Chart 2). At the lowest level are the individual items from the questionnaire and other pieces of data. Each of these items is assigned a scoring from 0 to 6, where a low score indicates the absence of anti-competitive regulation and vice versa. The items are then divided into 18 low level categories, including such categories as ‘Government direct control over business enterprises’, ‘legal barriers to competition’ or ‘tariffs’. A corresponding index number for these categories are then constructed by taking the arithmetic mean of score for the individual items. The same approach is then applied to construct index numbers for increasingly broad categories which finally aggregate up to the PMR. In the last step, for example, there are three broad regulation categories: ‘State control’, ‘Barriers to entrepreneurship’ and ‘Barriers to trade and investment’.

While the adopted aggregation strategy for the PMR has the advantage of being transparent, it also has some drawbacks which limit its reliability for assessing the impact of specific regulations. For one, the scoring approach adopted for the indicator does not take a stand on the relative importance of each item considered. For example, the low-level category ‘protection of existing firms’ in the retail distribution sector consists of two ‘yes-no’ type questions: (i) ‘are commercial interests involved in licensing/permit decisions?’, and (ii) ‘are there products that can only be sold under a legal monopoly (franchise)?’. The scoring rule awards 6 to a ‘yes’ and 0 to a ‘no’. The score for the category is then the mean of these two values, ie either 0, 3, or 6. In Finland, for instance, both answers are ‘yes’ giving a maximum score of 6. This means that any regulatory reform that would change one or both of the ‘yesses’ into a ‘no’ would have a fairly sizable impact on the PMR, particularly compared to other categories where the scoring is based on a large number of items or real-

numbered data. In other words, the indicator tends to give more weight to items in categories where information is relatively scarce. Hence, the true benefit of reform in such areas will be exaggerated by the indicator.

Chart 2. The structure and information coverage of the OECD PMR indicators



The chart is taken from Wölfl et al (2009). The shaded boxes indicate integrated information from the ETCR and RBSR indicators. The values in parenthesis provide the aggregation weights to each sub-category.

A second noteworthy feature of the indicator is that the various included items differ largely across industries. This partly reflects different economic characteristics between industries, but also the availability of the data or, rather, the lack thereof. Broadly, more information is available for non-manufacturing industries (energy, transport, communication, retail distribution, and business services) than for manufacturing industries. This unbalance, not only impacts on the weighting between categories and items, but also leave certain industries unrepresented in the indicator – another reason for being cautious when interpreting it. For this reason, the OECD also report a few sub-indicators related to regulation in the non-manufacturing industries. The majority of the estimates of the impact of (de)regulation on productivity pertain to these sub-indicators, since they generally have better time-coverage than the PMR. We discuss them next.

3.2 Product market regulation in non-manufacturing industries

The OECD reports two sub-indicators of product market regulation in non-manufacturing industries: (i) the (ETCR) which covers regulation in 7 network industries (post, telecoms, electricity, gas, airlines, rail, and road), (ii) the RBSR which covers regulation in retail distribution and some business services (accounting, legal, architect, engineer). Based on these two indicators, as well as an indicator of financial regulation, the OECD has also constructed a Regulatory Impact (RI) indicator, which measures the potential costs and trickle-down effects of regulation in the aforementioned non-manufacturing industries on all industries.

The ETCR summarizes data related to ‘barriers to entry’, ‘public ownership’, ‘market structure’, ‘vertical integration’ and ‘price controls’, although this data is unevenly spread across the 7 network industries. The indicator is available for 21 OECD countries and has an annual time-coverage from 1975–2013. Most recent empirical studies on the effects of product market regulation are based on this measure due to its long time series coverage.

The RBSR summarizes data related to ‘barriers to entry’, ‘price control’ and ‘constraints on business operation’. It is available for 30 OECD countries and the years 1998, 2003, 2008, 2013. Due to its limited sample, it has played a more auxiliary role in the literature.

The RI is a more recent indicator that combines both the ETCR and the RBSR with industry input-output data to measure the ‘knock on’ effects of regulation in the non-manufacturing industries on all industries. Nevertheless, it has already been used extensively in the literature.

3.3 Caveats

While it is hugely convenient to be able to summarize the extent of product market regulation by a single real-valued indicator, there are a number of caveats. First, regulation and its impact on economic behavior is not straightforward. Hence, any summary indicator will, by necessity, give a distorted and overly-simplified picture of a much more complex reality. Second, regulation is not the same as enforcement. Anti-competitive regulation, for example, that is ignored in practice will not have large scale effects on competition.

Third, capturing the extent of regulation in a single metric involves a lot of judgment and tend to over-emphasize aspects on which data is more readily available. Finally, it is virtually impossible to evaluate the relative importance of different regulations, as this involves soft qualitative information. Hence, aggregating such regulations almost certainly leads to a

distorted picture, sometimes exaggerating unimportant features of regulation and sometime give little weight to significant aspects.

In the remainder of this note, I will make extensive use of the OECD indicator to assess product market regulation in Finland. Nevertheless, the above mentioned caveats should be kept in mind when interpreting the results. A considerable degree of caution is warranted.

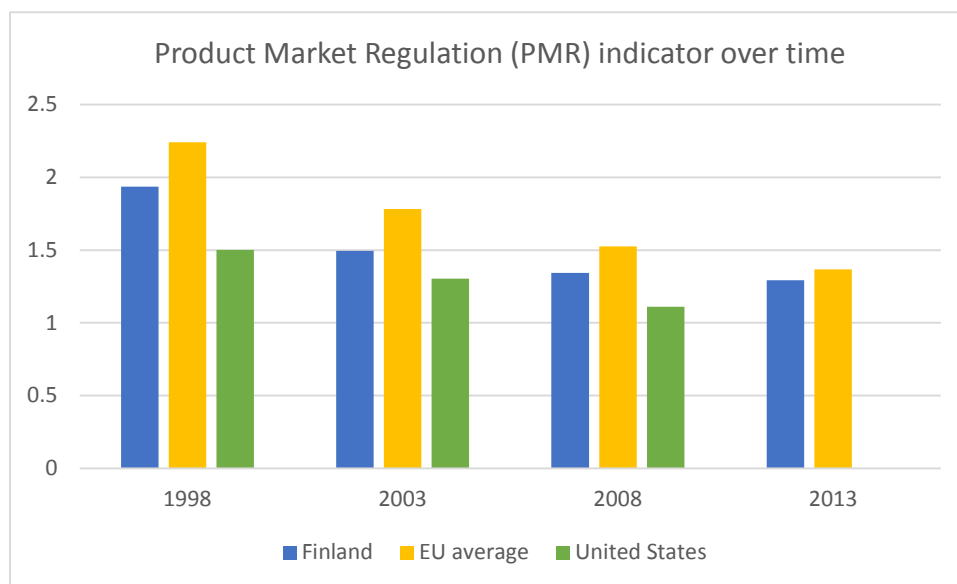
4 Product market regulation in Finland

Since the early 1980's, the trend in Finland has been towards less product market regulation. While other advanced European countries experienced similar trends, Finland made more rapid progress in this respect, particularly in the 1990's when it joined the EU.⁶ The phase of deregulation has, however, slowed down considerably after the change of the millennia (eg Maliranta (2008)) allowing other EU to catch up.⁷ At the current juncture, Finnish anti-competitive product market regulation is close to the EU average (see Chart 3).

⁶ OECD 2003.

⁷ Other indicators, such as various product market competition measures and the OECD economic freedom index show similar trends consistent with this view (see Kilpailukatsaus (2008)). Of course, the speed of deregulation naturally slows down as the level of regulation becomes sufficiently light.

Chart 3. Development in the OECD economy-wide Product Market Regulation (PMR) indicator over time



US estimates for 2013 are not available.

Although Finland is close to the EU average in terms of product market regulation in general, there is a substantial degree of disparity across sectors. For example, regulation in the Finnish manufacturing sector is quite light, allowing for both internal and external competition.⁸ In several non-manufacturing sectors, however, the degree of regulation is still high (see Table 1).⁹ Regulation in retail trade and some network industries where detailed information is available (post, railroads, airlines, gas), for instance, is still stronger than the EU average. And in some of these industries, the distance to EU ‘best practices’ is very large. Hence, it is in these industries that the potential benefits from deregulation is particularly high.¹⁰

⁸ OECD (2003).

⁹ More detailed Tables appear in Appendix A.

¹⁰ Similar conclusions have been reached by the OECD on several occasions, see eg OECD (2013).

Table 1. OECD indicators of product market regulation

	Finland	EU mean	EU min	EU max	US ¹
Economy wide (PMR)	1.29	1.37	0.92	1.74	1.11
Network sectors (ETCR)	2.47	2.00	0.79	2.90	1.65
Electricity	1.66	2.05	0.87	3.23	1.56
Gas	4.17	2.26	0.00	4.17	1.54
Telecom	0.56	0.89	0.27	2.66	0.60
Post	3.33	2.40	0.67	3.33	2.33
Rail	4.38	3.26	0.25	5.41	3.75
Airlines	1.68	1.00	0.00	3.55	1.00
Road	1.50	2.14	1.50	4.25	0.75
Retail trade (RBSR)	2.86	2.23	0.60	4.54	1.76
Professional services (RBSR)	0.62	2.15	0.55	3.47	1.35

The indicators take values between 0 and 6, going from a low to high degree of anti-competitive regulation.

Notes: ¹ US data for 2013 is not available – the values refer to 2008.

4.1 Key Finnish product market reforms from 1998 to 2008

It is instructive to take a closer look at the types of concrete reform that underlie the changes in the Finnish PMR from 1998. To this end we draw on information on key reforms from the Finnish Competition Authority, available up until 2008.¹¹ The key product market reforms over this period are listed in Table 2 and include: opening up competition for government purchases (public roads and services, in particular), separation between certain government tasks and commercial interest (notably in forestry), and increased competition in certain aspects of rail traffic.

These and other reforms lowered the product market competition indicators to a notable degree. For example, from 1998 to 2008 the Finnish PMR changed from 1.94 to 1.34 (on a scale from 0 to 6). In particular, the PMR sub-indicator ‘State control’ changed from 2.75 to 2.18, ‘Barriers to entrepreneurship’ from 2.36 to 1.58, and ‘Barriers to trade and investment’ from 0.70 to 0.27. The productivity gains from these reforms are likely quite substantial, as will be evident from next section where we perform a back-of-the-envelope calculation.

¹¹ See Kilpailukatsaus (2008).

Table 2. Main Finnish product market reforms over the 1998–2008 period

Year:	Reform:
2000	Cancellation of exclusive rights to government payment transactions
2001	Reform of the Water Act
2001	Restructuring of the Public Roads Authority
2001–02	Road building and maintenance subjected to competition
2002	Government purchases subjected to competition
2003	Rail traffic between Finland and EEA countries subjected to competition
2001–04	Maintenance contracts for public roads subjected to competition
2005	Separation of Finnish Forestry Authority governance tasks from commercial interests
2005	Separation of tasks related to government services from commercial interests
2006	Separation between the governance tasks of the aviation industry and the Finnish Civil Aviation Administration
2007	Rail transports for national goods subject to competition

Source: Finnish Competition Authority.

5 Quantitative assessments of reforms in Finland

This section conducts a back-of-the-envelope assessment of past and potential future gains to deregulation in Finland. For this I will draw heavily on the various OECD indicators, as well as, econometric estimates of their effects on productivity that appear in the literature. A more technical appraisal of this evidence appears in Appendix B.

As before, it should be noted that this type of calculation is subject to a number of caveats. For one, the econometric estimates are obtained from data panels comprising many firms and industries. Applying the results directly to individual countries or industries in the panel is hazardous. It may, for instance, be that Finland is an outlier country where the response to regulatory change is markedly different from the rest of the panel. Similarly, due to the slow and low variability of the regulation indicators, estimates of their effects are typically rather imprecise. Add to this aggregation errors from the OECD indicators, as well as known difficulties of measuring total factor productivity, and it is clear that confidence bands must be very wide indeed. Still, the vast majority of studies on deregulation – also

those that are based on specific deregulations in specific industries – point in the same direction: the efficiency gains are likely to be large.

5.1 Estimated productivity gains of reforms from 1998 to 2008

What were the effects on productivity from the Finnish product market reforms over the 1998-2008 period (see Chart 3)? To estimate this effect, I use results from Bouis et al (2011). Their results are well suited for this purpose. For one, their sample covers most of the period and their estimates refer to country level labor productivity (LP). Also, while total factor productivity is conceptually more relevant, labor productivity involves fewer approximation errors and is, hence, more reliable. Finally, they distinguish between long-run and short-run effects from product market (de)regulation. This is appealing as the productivity gains are allowed to have an upper limit.¹²

Selected estimates from the literature of the effects on productivity from changes in the PMR, as well as its sub-indicators, are listed in Table B1 of Appendix B. For example, Bouis et al (2011) estimate that long-run impact on labor productivity from a *positive* unit change in the PMR (ie, an increase in anti-competitive regulation) is –35%. The estimate is not very precise, with 95% confidence bands from –5% to –65%. These effects sound large, but two aspects should be noted. First, generating a unit change in the PMR requires large scale deregulation. As an example, the reforms listed in Table 2, that took place over the 1998-2008 period, reduced the PMR by 0.59 units, ie not even a unit change. Second, the effects of these changes are only slowly transmitted to productivity growth. For example, the estimated half-life (when productivity has increased by 17.5%) is about 11 years and it takes at least 40 years before the full long-run benefits have been reaped. For this reason, I report both the full long-run effect and the expected productivity gains over 5 years.

¹² In earlier work it was typically implicitly assumed that reform had a permanent effect on productivity growth. Hence, the estimated long-run benefits from reform is infinite.

Table 3. Back-of-the-envelope calculation of productivity gains to Finnish product market reforms over the 1998–2008 period

Indicator:				Impact on LP:	
	1998	2008	Change	5 years	Long-run
PMR	1.94	1.34	−0.59	6.7%	20.7%
State control	2.75	2.18	−0.57	0.4%	1.3%
Barriers to entrepreneurship	2.36	1.58	−0.77	4.2%	15.2%
Barriers to trade and invest.	0.70	0.27	−0.43	1.4%	4.9%

Table 3 reports the back-of-the-envelope calculation for the Finnish reforms from 1998–2008. As can be seen from the table, the estimated increase in labor productivity from these reforms is 20.7% over the long-run and 6.7% over five years.¹³ These are large effects even if the uncertainty surrounding them is large. However, the gains from deregulating specific areas are not even. Relaxing state control, for instance, does not give the same benefits as removing barriers to entrepreneurship. The contribution to productivity of the former reforms over the 5-year horizon was merely 0.4%, while the latter reforms contributed about 4.2%.

Overall, these numbers suggest that the benefits from the 1998–2008 reforms were large. Moreover, the simple calculation conducted here ignores several potentially important aspects. For instance, the effects are likely to be larger if the initial level of regulation is high or the initial distance to the productivity frontier is large.¹⁴ Similarly, interaction between labor market and product market reform would also lead to larger gains (eg Kent and Simon (2007)). Finally, I have only considered productivity increases here, but the reforms also likely decreased prices (Cette et al (2014)) and increased employment (Fiori et al (2012)). Each of these additional effects serve to increase social welfare.

5.2 Potential for future productivity gains

Given the potentially large benefits from reducing product market regulation, it seems reasonable to ask if there still are large gains to be reaped from future reforms. One way of answering this questions is to do a similar back-of-the-envelope calculation as before. But

¹³ The size of these effects are in line with previous OECD estimates of the productivity gains to regulation in Finland. OECD (2012), for example, estimates that the effect of reducing barriers to trade and investments to the OECD average – a drop of 0.14 in the sub-indicator – would increase labor productivity by approximately 3%.

¹⁴ Boone (2001) shows that intensified competition can reduce incentives to innovate. In this case the effects of deregulation may be bell-shaped, so that the productivity gains are large when the level of regulation is high. But the potential gains recede as competition intensifies.

now we consider what the likely gains would be if Finland reduced product market regulation to the EU average level in those areas/industries where the Finnish OECD indicators point to above average regulation. Of course, the same qualifiers and caveats with respect to such a calculation still apply.

Table 4. Back-of-the-envelope estimates of productivity gains to potential future Finnish product market reforms

Sector:		Indicator			Sector tfp impact:		Economy tfp impact:		
		Size VA	Current	EU mean	Change	5 years	Long-run	5 years	Long-run
Network sectors		5.9%	2.47	2.00	-0.47	17.4%	38.5%	1.0%	2.3%
Gas		NA	4.17	2.26	-1.91	70.7%	156.7%	NA	NA
Post		0.5%	3.33	2.40	-0.93	34.5%	76.5%	0.2%	0.4%
Rail		NA	4.38	3.26	-1.12	41.3%	91.6%	NA	NA
Airlines		0.4%	1.68	1.00	-0.68	25.2%	56.0%	0.1%	0.2%
Retail trade		3.7%	2.86	2.23	-0.64	23.5%	52.1%	0.9%	1.9%

It can be seen from Table 1 that Finnish regulation in retail trade and certain network sectors (post, rail, airlines and gas) is above the EU average. Since, these are sector specific indicators, the effects of regulatory change must be evaluated by sector specific estimates. For this purpose, I use estimates from Arnold et al (2011) who find that the long-run effect of a unit change in the sector specific Regulatory Impact (RI) indicator is about -82%. Again the uncertainty about this estimate is large, with 95% confidence ranges from -33% to -131%. The back-of-the-envelope calculations are reported in Table 4.

The calculations confirm that the potential gains to industry specific productivity are large. For example, the estimated productivity effect of a reduction in anti-competitive regulation in retail is about 23.5% over the next five years and 52.1% over the long-run. Given the relative size of this industry (in term of value-added), the economy-wide effects are about 1.9% over the long-run – a respectable number. One should note that to a large extent increases in social welfare come in the form of reduced consumer prices, which are likely to be particularly important in the case of retail.

6 Conclusions

The note provides an overview of the current state of product market regulation in Finland and an assessment of the potential efficiency gains to deregulation. Finland deregulated product markets rapidly during the 1990's, but the phase of reform has since slowed down. The overall degree of Finnish regulation is currently at the average EU level, but regulation it is still strong in some sectors, most notably retail trade and some network sectors (gas, post rail and airlines). Reducing anti-competitive regulation in these industries would likely lead to sizable efficiency gains for the economy.

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Appendix A (detailed PMR tables for Finland)

Indicator:	Finland	EU mean	EU min	EU max	US 2008
Product market regulation	1.29	1.37	0.92	1.74	1.11
State control	2.13	2.12	1.43	3.06	1.50
Public ownership	2.96	2.66	1.51	4.36	1.60
Involvement in business operation	1.30	1.58	0.99	2.79	1.40
Barriers to entrepreneurship	1.55	1.60	1.15	2.10	1.23
Complexity of regulatory procedures	1.63	1.69	0.41	3.37	0.15
Administrative burdens on startups	1.74	1.99	1.25	2.68	1.60
Regulatory protection of incumbents	1.26	1.11	0.64	1.50	1.95
Barriers to trade and investment	0.20	0.39	0.12	0.79	0.60
Explicit barriers to trade and investment	0.06	0.11	0.01	0.32	0.52
Other barriers to trade and investment	0.35	0.66	0.19	1.57	0.93

Table A1: The OECD PMR (economy-wide product market regulation) indicator and its high-level sub-categories for Finland in 2013. Bold values indicate areas where Finnish regulation is tighter than the EU average.

Indicator:	Finland	EU mean	EU min	EU Max
Retail Distribution	2.86	2.23	0.60	4.54
Licences or permits	3.60	3.36	0.60	6.00
Specific regulation of large outlet	3.00	2.90	0.00	6.00
Protection of existing firms	6.00	2.00	0.00	6.00
Regulation of shop opening hours	3.71	1.67	0.00	6.00
Price controls	0.86	1.56	0.00	3.43
Promotions/discounts	0.00	1.86	0.00	6.00

Table A2: The OECD RBSR (product market regulation in retail distribution) indicator and its sub-components for Finland in 2013. Bold values indicate areas where Finnish regulation is tighter than the EU average.

Industry	Indicator	Finland	EU mean
Network industries	Overall	2.47	2.00
Electricity	Overall	1.66	2.05
	Entry	0.00	0.14
	Public Ownership	2.70	3.13
	Vertical Integration	3.94	3.96
	Market structure	0.00	0.96
Gas	Overall	4.17	2.26
	Entry	4.00	0.33
	Public Ownership	1.44	2.06
	Vertical Integration	5.25	4.12
	Market structure	6.00	2.54
Telecom	Overall	0.56	0.89
	Entry	0.00	0.00
	Public Ownership	0.70	1.19
	Market Structure	0.98	1.47
Post	Overall	3.33	2.40
	Entry	0.00	0.10
	Public Ownership	4.00	4.13
	Market Structure	6.00	2.98
Rail	Overall	4.38	3.26
	Entry	4.00	2.00
	Public Ownership	6.00	5.39
	Vertical Integration	3.00	3.07
	Market Structure	4.50	2.57
Airlines	Overall	1.68	1.00
	Entry Barriers	0.00	0.10
	Public Ownership	3.36	1.90
Road	Overall	1.50	2.14
	Entry	3.00	3.90
	Prices	0.00	0.38

Table A3: The OECD ETCR (product market regulation in network industries) indicator and its sub-components for Finland in 2013. Bold values indicate areas where Finnish regulation is tighter than the EU average.

Appendix B (econometric estimates)

This appendix summarizes selected key results in the literature on the effects of the OECD product market regulation indicators on productivity. The relevant studies and the key results appear in table B1. The first column of the table reports the indicator used for a specific result. The second column reports the explained variable – some measure of productivity. The third column reports the estimated effect of a unit change in the indicator (ie a very large increase in regulation) and the last column reports the 95% confidence band for this estimate.

Indicator	Explained	Effect of unit change	95% confidence
<i>Nicoletti and scarpetta (2003); Sample: 23 industries, 18 countries, 1984-98; Level: industry</i>			
PMR	TFP growth (pa)	-0.01pp	0.00pp to -0.02pp
PMR*ETCR	TFP growth (pa)	-0.08pp	-0.06pp to -0.10pp
<i>Kent and Simon (2007); Sample: 18 countries, 1975-2003; Level: country</i>			
mean(ETCR)	TFP growth (pa)	-0.22pp	0.00pp to -0.40pp
<i>Bouis et al (2011); Sample: 40 countries, 1970–2005, Level: country</i>			
PMR	ln(Labor productivity)	Long-run: -35% Adjustment: -0.075	-5% to -65%
State Control	ln(Labor productivity)	Long-run: -7% Adjustment: -0.060	19% to -31%
Barr. Entrep.	ln(Labor productivity)	Long-run: -59% Adjustment: -0.075	-25% to -93%
Barr. Tra&Inv	ln(Labor productivity)	Long-run: -34% Adjustment: -0.076	-8% to -60%
<i>Arnold et al (2011); Sample: 10 countries, 39 industries, 100000 firms, 1998-2004; Level: firm</i>			
RI	ln(TFP)	Long-run: 82% Adjustment: -0.113	-33% to -131%
<i>Bourlès et al (2010); Sample: 15 countries, 12 industries, 85–07 (95–07 used); Level: industry</i>			
RI	ln(TFP)	Long-run: -388%; Adjustment: -0.032	0.00% to -776%

Table B1: Estimated effects of a unit change in various indicators on productivity.

The two first studies in the Table, Nicoletti and scarpetta (2003) and Kent and Simon (2007), estimate the effects of the indicators on total factor productivity (TFP) growth. They

find per annum effects of -0.01 and -0.08 percentage points from a unit change in the indicators, respectively. These effect may seem small, but are in actual fact huge. The reason is that the authors implicitly assume that regulation has a *permanent effect on productivity growth* – that is, an infinite change over the long-run.

The assumption of a permanent effect on growth seems somewhat unreasonable and later studies have relaxed it by distinguishing between short-run and long-run effects. As such, this provides more credible estimates. Technically, this is done within an error correction model where the indicators appear in the long-run relationship. The estimates from these studies are used for the back-of-the-envelope calculations in the main text. For each of them, the Table B1 reports two estimates: (i) the estimated long-run effect and (ii) the fraction of long-run steady state deviations that are adjusted each year. This information is sufficient to calculate the effects over given time periods, as well as half-lives for the adjustment process.

The results in Bouis et al (2011) are used to calculate the effects of deregulation at the economy-wide level. For the effects at the sectorial level, the choice is between Arnold et al (2011) and Bourle's et al (2010). While the estimates in the latter study refers directly to the industry level – and hence is more appealing – they are nevertheless very imprecise. Moreover, the estimated effect seems unreasonably high. The results in Arnold et al (2011) are more conservative and precise, even though they pertain to the firm level. For this reason, these estimates are used for in the main text.

Finally, it should be noted that a number of features have been left out from the table. In many of the studies, there are additional interaction effects, for example, between product and labor market regulation or between regulation and distance to the technological frontier. Moreover, in almost all of the papers, different specifications with different control variables were also estimated. The estimated effects of regulation sometimes vary substantially across these specifications.