Introduction and Overview

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In this volume, we reprint my articles on the following subjects: (i) trade policy guidelines; (ii) trade policy in the transition from communist or planned economies to market economies; (iii) unilateral, dynamic and environmental issues in trade using CGE models; (iv) trade policy of the United States in autos and steel; and (v) papers in mathematical economics. The papers in the first section of this volume were designed to help establish the knowledge base for World Bank country economists and others trying to establish trade policies in developing and transition countries that contribute to development and poverty reduction. These are papers on the role of trade policy in poverty reduction, tariff policy, exchange rate overvaluation problems, adjustment costs of trade liberalization, trade and technology diffusion, and rules of thumb on regional economic policy. My co-authors and I have emphasized, however, that there is no “one size fits all” trade policy. Trade policy must be adapted to the conditions of individual countries. The key issue in trade policy is only occasionally simply tariffs, as might be emphasized in textbooks. Non-tariff barriers, the costs of trading across borders, exchange rate overvaluation, regional trade issues, costs of services in trade, adjustment costs and rent-seeking are all issues that I have addressed in my experience of working in more than 25 countries as a trade policy advisor. Determining the primary trade policy problem is one of the first challenges a trade policy advisor must address in diagnosing the country’s trade regime. Probably nowhere was that adaptation to local conditions more important than in the design of trade policies for countries making the transition from communist or planned economies to market economies. The efforts of the former Soviet bloc countries to make this transition to market economies was without historical precedent, and the opportunity to work with these governments on the transition was both extremely challenging and incredibly energizing. The papers in the third section of this volume are based on very innovative computable general equilibrium models that are among my most widely cited papers. In the fourth section of this volume, I reproduce some of my papers on the automobile and steel sectors; the section includes papers based on partial equilibrium, general equilibrium and econometric models. The final section of the volume contains papers in mathematical economics.

In this introductory chapter, I provide a brief introduction to each of the five research topics and then summarize the articles themselves. Since the articles themselves only briefly touch on the policy contexts of the work, I emphasize the policy background to the papers in this chapter and the behind the scene issues a trade economist might have to address in carrying out the work. I also discuss the requests for the work from developing and transition countries to the World Bank, the key trade theory or policy insights, policy recommendations, conclusions and the policy impacts.

The papers in this volume have appeared in many of the economics profession's more prestigious peer reviewed journals, including *Econometrica*, *Review of Economic Studies*, *Quarterly Journal of Economics*, *Economic Journal*, *Journal of International Economics*, *International Economic Review*, *European Economic Review*, *Canadian Journal of Economics*, *Economic Inquiry*, *Journal of Comparative Economics*, *Review of International Economics*, *World Economy*, *Southern Economic Journal*, *World Bank Economic Review*, *Japanese Economic Review* and *the Latin American Journal of Economics*. Many of these papers were discussed with governments that requested early versions of the work and, as such, have passed the dual test of being academically rigorous and policy relevant.

Part 1. Trade Policy Guideline Papers

In 1991, World Bank Research Department economists Vinod Thomas, John Nash and others (Thomas, Nash and Associates, 1991) produced a volume on best practices in trade policy reform. During the 1990s, however, the World Bank substantially increased its focus on poverty reduction; and the role of globalization on global poverty came under increased scrutiny, partly reflected in annual large demonstrations during the World Bank-IMF annual meetings. The international trade group in the World Bank saw the need for an update of Thomas, Nash and Associates (1991). In 2002, Bernard Hoekman, Aaditya Mattoo and Philip English produced *Development, Trade and the WTO, A Handbook*. This volume was a 55 chapter Handbook for the World Bank designed to be a guide for how international trade generally and the World Trade Organization in particular could contribute to economic development and poverty reduction.

Three of the papers in this section are from the Handbook: (i) a shortened version of the key World Bank paper on trade strategies for poverty reduction; (ii) tariff policy, especially relating to uniform tariffs; and (iii) problems of exchange rate overvaluation. Despite substantial concerns about adjustment costs of trade liberalization, it is surprising that so little had been written on the evidence; a fourth paper summarizes the empirical studies on the adjustment costs of trade liberalization. A fifth paper summarizes the evidence on technology transfer through trade. The last paper develops rules of thumb in regional trade arrangements based on results my coauthors and I had found in several studies we had conducted.

Chapter 2: Rules of Thumb for Trade Policy for Poverty Reduction, Constantine Michalopoulos, Maurice Schiff and David G. Tarr, in *Development, Trade and the WTO: A Handbook*, B. Hoekman, A. Mattoo and P. English (eds.). The World Bank, 2002

Given the focus of the World Bank on poverty reduction, World Bank country teams were tasked with developing poverty reduction strategies in collaboration with their developing country client governments. In order to assist the country teams with the development of those strategies, the World Bank developed a two volume *Sourcebook for Poverty Reduction Strategies* (World Bank, 2002). The original version of this paper appeared as chapter 13 of that Sourcebook and as such, represented the World Bank's view of how trade policy reform fits into a poverty reduction strategy, see Hoekman, Michalopoulos, Schiff and Tarr (2002). The paper that we reproduce here is the chapter in the "Handbook," which is a shortened version of the "Sourcebook" chapter.

We outline the basic elements of good trade policy for growth and poverty reduction. We focus on policies that impact the poor. The title includes the expression "rules of thumb" in recognition of the fact that policies must be adapted to the specific conditions of particular countries. Further, the chapter emphasizes the need for a variety of complementary policies (including institutional development, macroeconomic stabilization, competition policies, and given their importance for the poor, policies that impact labor and agricultural markets) to accompany trade policy reform. The chapter emphasizes that while trade policy reform is a very important component of a development strategy, trade policy alone is not sufficient for growth and poverty reduction. I mention this latter point, since the World Bank is sometimes falsely accused of recommending trade policy reform alone as sufficient for a development strategy.¹

The chapter concludes by noting that trade policy reform should not wait until everything is in place to facilitate the reform, but some essential pre-conditions are specified. The poor are least able to bear risks, and in the short run trade liberalization may induce losses for some groups. Analysis of policies in the status quo that favor the poor prior to reform is important. General safety nets are first best, but may not exist or be inadequate in many low-income countries. In such situations reforms should not be postponed, but should be implemented gradually, following a pre-announced schedule, and complemented by actions to minimize adverse consequences to the poorest in society.

¹See also Thomas, Nash and others (1991) for an earlier volume of the World Bank on trade policy that emphasizes complementary policies for economic development.

Chapter 3: On the Design of Tariff Policy: A Practical Guide to the Arguments for and Against Uniform Tariffs, David G. Tarr, in *Development, Trade and the WTO: A Handbook*, B. Hoekman, A. Mattoo and P. English (eds.). The World Bank, 2002

The original version of this paper was written at the request of the Minister of Trade of the Russian Federation in the late 1990s (Tarr, 1999). I revised and updated this version of the paper when the international trade group of the World Bank research department decided to produce a Handbook on international trade for development. This paper became the central paper on tariff policy in the Handbook.

An effective trade policy is central to the integration of developing countries into the international economic system and the growth that will generate. Tariff policy is the centerpiece of trade policy in a market system. Tariffs are, with very few exceptions, the only acceptable policy tool for protection under the GATT/WTO. They are superior to alternative instruments of protection, such as non-tariff barriers (NTBs) like quotas, licenses and technical barriers to trade (TBTs), because they are less likely to lead to rent seeking and corrupt practices, and because tariffs limit the exercise of domestic monopoly power where it exists whereas NTBs do not.

This chapter examines the arguments for and against a uniform tariff structure. Arguments against uniformity are: terms of trade; “strategic,” infant or restructuring industry considerations; revenue or balance of payments purposes; and tariffs as a negotiating tool at the WTO. Arguments in favor of uniformity are: political economy considerations; administrative convenience; and reduction of smuggling and corruption in customs. We maintain that tariff uniformity is the best choice in practice.

In many circumstances where tariffs are second best policy instruments, such as to raise public revenue or to cope with balance of payments problems, a uniform tariff rate is the most practical and efficient alternative. Where a country may be interested in using the tariff as a bargaining instrument in multilateral negotiations, it is immaterial whether the tariff is uniform or differentiated— the issues have to do with its capacity to use the tariff as a bargaining instrument and what it bargains for. Differentiated tariff protection in support of infant or restructuring industries is typically ineffective at addressing the alleged market failure problem; governments are not very good at picking winners and there are serious dangers that the policy would be overwhelmed by requests for protection from vested interests irrespective of its economic merits.

A **uniform tariff** conveys a number of advantages, the most important of which is that if the tariff is uniform, the gains to industry lobbying are much smaller (and may be negative), creating a kind of free-rider problem for the lobbying industry that **dramatically reduces the incentive to lobby for protection**. Then: (1) the level of protection is likely to be lower (the experience of Chile is a dramatic case in point); (2) there is a direct saving of resources from the reduced lobbying; (3) the

reduction to the gains from lobbying for protection provides a vastly improved signal to valuable entrepreneurial talent which will thus be encouraged to create better and cheaper products; and (4) the reduction in resources devoted to lobbying will result in less corruption in government, which may have positive spillover effects into other dimensions of government activity.

Chapter 4: Adjusting to Trade Policy Reform, Steven J. Matusz and David G. Tarr, in *Economic Policy Reform: The Second Stage*, Anne O. Krueger (ed.). The University of Chicago Press, 2000

Notwithstanding the skeptical comments of Rodriguez and Rodrik (2001) and Rodrik, Subramanian and Trebbi (2004), I judge there to be strong evidence of improved incomes and poverty reduction from trade reform when trade reform is part of a comprehensive development strategy. Evidence comes from many studies including Frankel and Romer (1999), Dollar and Kraay (2003; 2004) and Freund and Bolaky (2008). Nonetheless, some policy makers are reluctant to implement trade reform due to fear of excessive adjustment costs. Policy makers may fear they will incur the anger of the owners of displaced resources while the benefits may accrue in later years; but their fears may also be based in part on the fact that there is much less written and known on the subject of the nature, magnitude, and duration of adjustment costs, leading to exaggerated fears of adjustment costs. In this paper, Matusz and I attempted to fill the void in the literature by surveying the evidence on the adjustment costs of trade liberalization, and placing those estimates of adjustment costs in perspective relative to the gains from trade liberalization. An earlier version of this paper appeared as a chapter in the *Global Economic Prospects* (World Bank, 1997).²

Our key results are as follows: while we find that it is necessary to apply caveats to most of the more than 50 studies we survey, virtually all the studies find that adjustment costs are very small in relation to the benefits of trade liberalization. And those studies that focused on manufacturing employment in developing countries found that employment had typically increased within one year after liberalization. Collectively, the weight of so many studies of various types, all pointing in more or less the same direction, makes it difficult to avoid the conclusion that adjustment costs are relatively very small relative to the benefits of trade liberalization.

The explanation for the low adjustment costs in relation to the benefits is as follows: (1) most importantly, adjustment costs are typically short term and terminate when workers find a job, while the benefits of trade reform can be expected to grow with the economy; (2) estimates of the duration of unemployment for workers in most industries are not high, especially where workers were not earning substantial rents in the original job; (3) in many industries normal labor turnover exceeds dislocation from trade liberalization, so that downsizing where necessary could be

²The paper has been cited in the professional literature more than 200 times.

accomplished without much forced unemployment; and (4) it has been observed that a significant portion of the resource reallocation after trade liberalization was accomplished through intra-industry shifts, which minimized the dislocation of factors of production. In addition, developing countries would be expected to have comparative advantage in labor intensive industries, so trade liberalization should favor labor.

Chapter 5: Exchange Rate Overvaluation and Trade Protection: Lessons from Experience, Howard J. Shatz and David G. Tarr, in *Development, Trade and the WTO: A Handbook*, B. Hoekman, A. Mattoo and P. English (eds.). The World Bank, 2002

The key conclusions are the following. Experience shows that protection to defend an overvalued exchange rate will significantly retard the medium to long run growth prospects of the country. In fact, an overvalued exchange rate is often the root cause of protection, and the country will be unable to return to the more liberal trade policies that allow growth without exchange rate adjustment. Worldwide experience has shown that defending the exchange rate has no medium-run benefits, since falling reserves will force devaluation eventually. It is better that the devaluation be accomplished without further debilitating losses in reserves and lost productivity due to import controls.

Howard Shatz and I wrote the first version of this paper as the basis of my one-person World Bank mission to Kazakhstan in March 1999. The Kazakhstan tenge had become significantly overvalued during early 1999. Kazakhstan defended the tenge with bans on imports from Russia of many categories of foodstuffs, prohibitively high tariffs on imports of several categories of products from Kyrgyzstan and Uzbekistan, and threatened "antidumping" actions. The International Monetary Fund (IMF) team had not been able to convince the authorities to adequately devalue the tenge, the protectionist trade actions of Kazakhstan were having a negative impact on growth and these action threatened to incite a trade war.

IMF staff responsible for Kazakhstan agreed that it would be useful for me and Howard Shatz to write a concise survey on the worldwide experience with the effects of overvalued exchange rates in terms understandable to policymakers to facilitate my discussions with the authorities in Kazakhstan. This short paper presents theory, cross-country econometric evidence and important case studies of the effects of overvalued exchange rates. To achieve wide dissemination in Kazakhstan, we had the short paper translated into Russian. I had discussions with several Ministers and gave two seminars during my one week in Astana, Kazakhstan. In general, my counterparts in the Government of Kazakhstan found the arguments in the paper convincing. Even the Minister who was the architect of the policies that led to the overvalued exchange rate agreed. It was my impression that it was the country

experiences, rather than the theory or econometric evidence, which was the most convincing part of the paper to the authorities.

My mission was organized by Mr. Oraz Jandosov, who was both the Minister of Finance and the First Deputy Prime Minister. In my final wrap-up meeting, very late on a Friday night, Mr. Jandosov agreed to devalue the following Monday. The Prime Minister, Mr. Nurlan Balgimbayev, announced the devaluation the following Monday as promised, and used many of the arguments of the paper in his announcement. I believe the paper was directly responsible for the success of the mission in achieving the objective of a devaluation to create a competitive exchange rate.

Since governments are frequently confronted with the problems of external shocks and external trade deficits in the context of a fixed exchange rate regime, we judged that a concise paper building on the paper written for Kazakhstan should be useful for the World Bank Handbook on trade and development. The version in this volume, taken from the Handbook, is revised and updated from the earlier paper for the mission to Kazakhstan.

Chapter 6: International Knowledge Flows and Economic Performance: A Review of the Evidence, Giorgio Barba Navaretti and David G. Tarr, *The World Bank Economic Review*, 2000

This paper is a summary of the literature on technology transfer and its impact on total factor productivity (TFP), especially in developing countries. Giorgio Barba Navaretti and I summarize the overall literature, but focus on the papers in the symposium volume that we edited for *The World Bank Economic Review*. The volume grew out of the conference on this subject held in Milan, Italy in 1998.

We note that the empirical literature has established that imported technologies raise TFP, especially when technologies are acquired through imports of intermediate goods. The role of foreign direct investment is mixed: although productivity of the economy increases, the impact on producers in the same industry, who remain unaffiliated with the foreign investors, is often negative. Small economies, especially small developing countries, are more dependent on technology transfer than large countries. Access to foreign research and development is crucial for the typical developing country, and openness to trade and technology transfer with industrial countries is fundamental to obtaining that access.

The type of technology that developing countries import is limited by their human capital or capacity to effectively use the most advanced technologies. The evidence shows that developing countries are more likely to purchase older and simpler technologies, especially when new machines embody rapidly increasing technology. Empirical studies have shown that government attempts to limit or guide the choice of technologies are likely to hamper growth because they may force

producers to buy technologies they are ill equipped to use or limit the choice of the most effective technologies. Policies aimed at promoting technological development need to address the complementarities between physical and human capital, i.e., policies to develop the education sector may be the most effective for modern technology adoption, when the absorptive capacity of the country limits the choice of technologies.

Chapter 7: Rules of Thumb for Evaluating Preferential Trading Arrangements: Evidence from CGE Assessments,
Glenn W. Harrison, Thomas F. Rutherford and David G. Tarr,
Cuadernos de Economía (Latin American Journal of Economics), 2003

When focusing on tariff reduction, economic theory yields mostly ambiguous results regarding the benefits of preferential trade arrangements (PTAs). Partly as a result, policy-makers often seek quantitative evaluations of their prospective PTAs. At the request of the governments involved, I have been involved in CGE modeling exercises assessing the impacts of PTAs in Chile, Brazil, Turkey, Tunisia, Morocco, Armenia, Kazakhstan, Belarus, Kenya and Tanzania. In addition, my co-authors and I have analyzed: the impacts of the single market of the European Union; the impact on the Kyrgyz Republic of joining the EurASec Customs Union; Ukraine's trade policy options including the Deep and Comprehensive Free Trade Agreement with the European Union and relations with the Eurasian Economic Union, and, recently, at the request of the Eurasian Economic Commission, the impact of reducing non-tariff barriers in the Eurasian Economic Union.³ In this paper, Glenn Harrison, Thomas Rutherford and I develop rules of thumb based on the results of (a substantial portion of) this work.

We find that: (i) countries excluded from PTAs virtually always lose from narrow PTAs; (ii) market access is very important to an assessment of net benefits (although theoretical analysis often ignores it); (iii) a significant advantage of a free trade agreement (FTA) over a customs union is that, with a FTA, the external tariff can be lowered so that a poor FTA can become beneficial; (iv) developing countries can expect less of an adverse terms of trade effect in agreements with industrialized countries; (v) the world gains significantly more from multilateral agreements than from a network of PTAs; (vi) for countries with low protection, multiple PTAs will likely be substantially more beneficial than unilateral trade liberalization; (vii) tax replacement reduces the set of beneficial PTAs; and (viii) trade taxes are typically an inefficient source of tax revenue.

³See Harrison, Rutherford and Tarr (1996) for the European Union, Michalopoulos and Tarr (1997) for the Kyrgyz Republic, Hoekman, Jensen and Tarr (2014) for Ukraine.

Part 2. Trade Policy in the Transition from Planned to Market Economies

In 1989, six countries in Central and Eastern Europe broke away from the former Soviet Union and began a transition from communist economies toward market economies. In 1991, the former Soviet Union broke up into 15 newly independent states, most of which began the transition toward market economies. In economic history, this was a unique historical period, as there was no historical experience of countries that previously tried to make the economic transition from communist economies to market economies. The fundamental institutions of market economies were not in place, such as property registration, price determination by markets, financial institutions that served as intermediaries between savers and borrowers, or in the case of my area of work, international trade, banking and financial institutions for the conduct of international trade by private agents. Those of us involved in providing advice to the countries of Eastern Europe and the 15 newly independent countries of the former Soviet Union were faced with the challenge of advising a transition path that led toward market economies, while at the same time minimizing the very substantial costs of the transition. The transition issues attracted many of the profession's top economists. Given the lack of historical experience, the work was very challenging and at the same time very energizing. Working with the governments of countries who were in the process of making the transition from communist economies to market economies was an enormously exciting and rewarding aspect of my career.

The World Bank quickly moved to establish offices and work programs with most of the transition countries; it was a key institution that advised the transition countries on many transition issues, especially international trade arrangements. The transition in Central and Eastern Europe began when I was only one year into my World Bank career, and I was fortunate to be located in the Department responsible for Eastern Europe and later in the Research Department, where, in both cases, I was well situated to work on international trade issues in the transition countries. I worked in Poland and Hungary between 1989 and 1991, including as the trade negotiator on the two "Structural Adjustment Loans" to Hungary during this period. The work on Poland led to an evaluation of appropriate exchange rate policy given a network of distortions (Tarr, 1990a) and two papers in this volume, Tarr (1990; 1994a), that provide detailed microeconomic case studies of the extremely complicated nature of resource and rent allocation in the former communist countries. The work on Hungary led to journal articles on transition issues emanating from the demise of the CMEA (Tarr, 1992) including its terms of trade implications (Oblath and Tarr, 1992) and the impact of non-tariff barriers in agriculture (Morkre and Tarr, 1995) as well as a report, World Bank (1991), on the implications of the collapse of the CMEA on Hungary.

When the former Soviet Union broke up in August-September 1991, I switched my focus regarding the transition countries to the former Soviet Union. With my World Bank colleague Constantine Michalopoulos, we wrote the key policy papers for the World Bank on transition trade and payments arrangements for the 15 newly independent states of the former Soviet Union (Michalopoulos and Tarr, 1992, 1994, 1996) and several short journal articles based on these papers (Michalopoulos and Tarr, 1993, 1994a, 1996a). Michalopoulos and Tarr (1992, 1996) are two of the key papers that formed the basis of World Bank advice to our client countries, and these are chapters eight and nine of this volume. Tarr (1994), which is chapter twelve, estimates the large shift in the terms of trade among the fifteen newly independent states of the former Soviet Union in favor of the energy and raw material exporters. Based on work I did with the Government of the Kyrgyz Republic, in Michalopoulos and Tarr (1997) we argued that it would be best to avoid customs unions in the Commonwealth of Independent States, even if free trade agreements were beneficial. Based on my work with the Government of Kazakhstan, Tarr (1999a) and Shatz and Tarr (2002) explained the problems of overvalued currencies, and Tarr (1997) explains the issues and problems of the highly protective trade regime of Uzbekistan. Very often during those first eight to ten crucial transition years, I felt incredibly fortunate to be in the right place in the right institution to be able to work with these transition countries at such a crucial period in their history.

Accession to the World Trade Organization (WTO) became a major trade issue for most of the newly independent states of the former Soviet Union. Beginning in 1998, I devoted a great deal of time to assist several of these countries with their accessions to the WTO, primarily Russia, but also Kazakhstan, Belarus, Ukraine, Moldova and the Kyrgyz Republic. Given the importance of services negotiations in WTO accession, this work led to important developments in modeling and assessing the impact of liberalization of barriers against foreign providers of services, especially foreign direct investment in services, including Jensen, Rutherford and Tarr (2006, 2007) and Rutherford and Tarr (2008, 2010) for Russia; Jensen and Tarr (2008) for Kazakhstan; World Bank (2015) and Balistreri, Oleksyuk and Tarr (forthcoming) for Belarus. In Shepotylo and Tarr (2008, 2013) we assessed the changes in the tariff regime of Russia and the Eurasian Economic Union as a result of the WTO commitments of Russia and its other policy changes, including making estimates of the ad valorem equivalents of the specific tariffs. In Bohringer, Rutherford, Tarr and Turdyeva (2015) we assessed the environmental implications of Russian WTO accession and showed that our modeling approach makes a crucial difference to an assessment of the net benefits of policies to improve the environment. At the request of the Government of Russia, I led two courses of two weeks each to about 100 teachers of international trade and government officials from Russia and neighboring states on trade policy and WTO accession. Due to the dearth of material available in Russian, we produced a 43 chapter volume in Russian for this course and a website with the materials, including Tarr (2006). In Tarr (2007) and Tarr and

Volchkova (2010, 2013) we summarized both the modeling and policy issues associated with Russian WTO accession. As explained in my first volume in this series, Tarr (2014, 12-15), the work of my colleagues and I in Russia has been independently assessed to have been very effective in influencing public opinion regarding WTO accession, and the lead trade negotiators in Kazakhstan and Ukraine have adopted our themes in explaining the rationale for WTO accession in their countries. Tarr and Thomson (2004), which is chapter fourteen in his volume, is on Russia's gas pricing policy and was perhaps the most controversial issue in Russia's WTO accession. Production of the paper itself was the most controversial process of my career, but has been credited with resolving the highly contentious issue between Russia and the European Union and for getting the Russian WTO accession discussions back on track.

As of July 2016, 11 of the 15 states of the former Soviet Union were WTO members. The major issue in the second decade of our new millennium for many of the countries of the former Soviet Union is how to address regional trade initiatives with the European Union and the Russian led Eurasian Economic Union. The papers by Jensen and Tarr (2012) on Armenia, Hoekman, Jensen and Tarr (2014) on Ukraine and Tarr (2016) on the Eurasian Economic Union address these issues, but are not included in this volume.

Eventually, I worked in 13 of those 15 newly independent states, producing studies in ten of them. To this day, the transition countries of the former Soviet Union remain a focus of my research. During the summer and early fall of 2013, I authored the paper entitled "Trade Policy Strategic Action Plan for 2013-2017" for the ten countries of the Central Asia Regional Economic Cooperation (CAREC).⁴ I took on this assignment partly as a result of my view that our trade policy advice to the Central Asian countries had not paid sufficient attention to their geographic isolation from major markets. Given their enormous distances to open ports or large markets, the countries of central Asia have especially challenging problems in integrating into the world trading environment. The key innovative strategy of this strategy paper, relative to the earlier strategic trade strategy of CAREC, was the agreement of the ten Ministers of the CAREC countries to emphasize trade in goods or services where the ratio of the value of the product to the transport costs are high. Electronic trade in services such as banking, accounting and other professional services are examples. The policy implication is that the reduction in barriers to trade in services is especially important for the CAREC countries.

⁴Adoption of the trade strategy paper required unanimous approval by the Ministers of ten CAREC countries. After discussion and adaptation with the senior trade policy advisors of the ten countries, the Ministers adopted the trade strategy paper at their meeting in Astana, Kazakhstan in October 2013. See: http://www.carecprogram.org/uploads/events/2013/SOM-Oct-KAZ/002_107_212_Trade-Policy-Strategic-Action-Plan.pdf

Chapter 8: *Trade and Payments Arrangements for States of the Former USSR*, Constantine Michalopoulos and David G. Tarr, *Studies of Economies in Transformation* No. 2, The World Bank, 1992

In January and February of 1992, I participated in World Bank missions to Estonia, Latvia, Lithuania and Russia. Based on these missions and discussions with World Bank staff working in other countries in the former Soviet Union, I learned that the new independent states had created a network of export controls and licenses that significantly constrained trade to each other. Trade among the former republics of the Soviet Union had been determined by intergovernmental agreements under the planning mechanism; so trade was not based on market or comparative advantage principles, and it needed to be reoriented toward the West in the long run. However, given the strong production linkages of their economies as a legacy of the Soviet Union, the collapse of trade among the newly independent states was very worrisome. At the same time, the World Bank and the IMF learned that the newly independent states of the former Soviet Union were experiencing a severe output decline. Given the production linkages of the countries of the former Soviet Union, it was clear to us the output decline was significantly aggravated by a collapse of their international trade, especially trade among the newly independent states. Constantine Michalopoulos and I saw the urgent need for a paper to lay out a trade and payments strategy for these countries for their transition toward a market economy. We wanted that strategy to lead toward the long run goal of integrating these countries into the world trading system as market economies, but it had to significantly reduce the disruption of trade during the transition that was sharply aggravating the output decline.

We found that the root cause of the export restraints among the newly independent states was the monetary and payments system. In early 1992, all 15 countries were using the ruble as their currency. Although only Russia could create physical rubles, the central banks of all 15 states could create ruble credits in the banking system. Exports from country A to another country in the common ruble zone created ruble credits in country A's banking system; but, given the absence of coordinated monetary policy, that was something that the central bank of country A could create without the goods leaving the country. Clearly, independent currencies would solve the problem, and this was my preferred solution. What the IMF recommended is disputed, but from what I observed, the IMF suggested a coordinated monetary policy in a common ruble zone, something that I did not think was feasible.⁵ For the period

⁵The Russian government, led by Prime Minister Yegor Gaidar, indicates it wanted to create an independent currency, but reluctantly went along with the IMF recommendation to preserve the common ruble zone for a period of about one year. Odling-Smee and Pastor, however, maintain that they did not pressure or recommend to the Russian government to preserve the common ruble zone; they claim they merely presented options. See the exchange between Yegor Gaidar (2002)

after the introduction of new, possibly inconvertible, currencies, we proposed solutions that addressed the problem of incentives for exports among the newly independent states, and mechanisms for allowing enterprise to enterprise trade. We discussed the advantages and disadvantages of a clearing union, payments union and auction market for rubles in countries with new currencies. We explained why import competition was very weak during this period and the case for preferential trading arrangements among the 15 states during the transition. This study became the basis for World Bank advice on trade and payments to the 15 countries of the former Soviet Union. (See Michalopoulos and Tarr, 1992 for the statistical tables.)

Chapter 9: *Trade Performance and Policy in the New Independent States*, Constantine Michalopoulos and David G. Tarr, *Directions in Development*, The World Bank, 1996

By 1994, World Bank teams, as part of their economic and sector work, had conducted studies of the trade and payments regimes of the majority of the newly independent states of the former Soviet Union. Most of that research, which included assessments of the pace and success of the reform efforts, was unavailable outside of the World Bank. For the volume *Trade in the Newly Independent States*, (Michalopoulos and Tarr, eds., 1994) the authors of eight of the comprehensive country economic studies (Estonia, the Kyrgyz Republic, Latvia, Lithuania, Moldova, Russia, Ukraine, Uzbekistan), discussed the country's trade and payments arrangements in the context of the country's overall macroeconomic, regulatory and enterprise adjustment. Bringing these experiences into the public domain for external scholars and collecting them in one volume, together with some important complementary papers, helped to assess what was working well in transition and where policy-making needed to improve.

In our 1996 monograph *Trade Performance and Policy in the New Independent States*, Michalopoulos and I summarized the key results of those studies. All 15 new independent states (NIS) established in the economic space of the former Soviet Union (FSU) suffered big declines in output and trade after their independence. Ineffective trade and payments policies were at the root of the decline in trade, which has been linked to the contraction in output. Their heavy economic interdependence, its roots in the centralized state planning system of the FSU, intensified the problem. Countries that reformed slowly often maintained that their strategy would reduce the high cost of transition. In the NIS, however, the slow adjustment strategy typically backfired. The slow reformers in the first decade of transition, such as Ukraine, Uzbekistan, Turkmenistan, Belarus, and Georgia, did not arrest their output decline and faced most of their adjustment costs in

and Odling-Smee and Pastor (2002) on the conflicting views of the Russian government and the IMF on whether Russia should create an independent currency in the early transition period.

later years.⁶ The Baltics, the fastest reformers, did the most to reorient production and trade, and they were the first to arrest the output decline. The Kyrgyz Republic, Moldova, and Russia, fell in between the two extremes; they introduced trade and other reforms at an intermediate pace, but it took longer to arrest the declines in output and trade.

Regarding their roles during the early transition years in these countries, the study also elaborates on export restraints, the myth of import protection, state trading, payments difficulties, the terms of trade shock, OECD market access and the political economy of rent seeking. Although some blame import competition from the West as a major cause of the output decline (e.g., McKinnon, 1991), in our interviews and from other evidence, we found that import competition was very weak. The primary reason was very undervalued currencies. Due in part to widespread export restraints, at market exchange rates that prevailed in 1992 in Russia, the average worker was earning only ten dollars per month.⁷ Consequently, we found that import competition was very weak in the early transition years. In fact, imports were so uncompetitive that the Russian Government subsidized the purchase of imports. The World Bank trade strategy report for Russia in 1993 (World Bank, 1993, 37–39) documented that the subsidies to imports in Russia amounted to US\$ 18.6 billion in 1992; this was a staggering 17.5 percent of GDP. Machinery and equipment received 49 percent of the import subsidies and food products received 35 percent of the subsidies, with subsidies varying by sector from a low of 61 percent of the value of food imports to a high of 90 percent of the value of food processing equipment (World Bank, 1993, table 2.11).

Chapter 10: Quantifying Second-Best Effects in Grossly Distorted Markets: The Case of the Butter Market in Poland, David G. Tarr, *Journal of Comparative Economics*, 1990

The original version of this paper was written as part of the World Bank Country Economic Memorandum for Poland in 1989, and was based on a World Bank mission to Poland in February-March 1989. Poland, in the spring of 1989, was the first of the six countries of Eastern Europe to break away from the Soviet Union and start its transition toward a market economy. While we were there, high level round table negotiations between the Communist led Government and the Solidarity led political opposition were underway on a strong reform agenda, which encouraged the World Bank team to believe that many of the reform recommendations might be implemented. Nonetheless, the break from the Soviet Union, and the magnitude

⁶Georgia and Ukraine significantly increased the pace of reform in the new millennium.

⁷This was not a purchasing power parity exchange rate, so did not reflect standard of living, but did reflect difficulty of importing.

of the reform (highlighted by what became to be known as “Shock Therapy” in January 1990) surprised us.

This is one of three papers I wrote for the Country Economic Memorandum on Poland’s trade regime. I received outstanding and crucial data support and advice on all three papers from Bohdan Wyżnikiewicz. I later learned that Bohdan had been blacklisted for employment by the Communist Government of Poland due to his involvement in Solidarity. Solidarity was the first trade union in a Warsaw Pact country not controlled by the Communist Party and it became a broad movement for social change, with its membership reaching one-third of the working age population of Poland at its peak. After years of repression of Solidarity by the Government, the Government was forced to negotiate with Solidarity in 1989, which led to the election of the leader of Solidarity, Lech Walesa, as President of Poland in 1990. In the new Government, Bohdan Wyżnikiewicz was then named President of the Central Statistical Office of Poland, and served in that position in 1991–1992.

My work on Poland was my first experience working in a country that became known as a “Transition” country, i.e., a country making the transition from a centrally planned economy to a market economy. What surprised me the most about the trade regimes at the sector level in the former communist countries was the multiplicity and redundancy of constraints, any one of which would suffice to completely control the trade regime. Frequently, there would be: (i) licensing of imports; (ii) monopoly control of imports through a state trading company; and (iii) foreign exchange rationing with licenses. Tariffs played only a minor role in import control in the former communist countries; and products considered essential often received implicit import subsidies through centrally allocated foreign exchange at below market exchange rates.

At the microeconomic level, markets of the centrally planned economies were often characterized by a complicated maze of interrelated and offsetting distortions. The Polish butter market in 1989 was a case of a grossly distorted market in which the Government employed price controls, direct subsidies to producers, export restraints and implicit taxes. Despite receiving substantial direct subsidies from the Government, the representatives of the Polish dairy industry we met argued that they would be better off with the elimination of all the distortions, including the production subsidies.

The estimates of this paper indicate that eliminating all distortions would result in substantial gains to Poland, and support the view of the Polish dairy industry that the net impact of the distortions was negative for Polish dairy farmers. Removal of some of the distortions, but not all, results in much smaller net gains to Poland. In fact, the case of the removal of production subsidies with other distortions in place results in net losses to Poland, in classic “second best” fashion. This is because in the presence of domestic price controls and implicit subsidies to imports to clear the market, the losses from the increased cost of the import subsidies exceeds the gains from the reduction of production subsidies.

Chapter 11: The Welfare Costs of Price Controls for Cars and Color Televisions in Poland: Contrasting Estimates of Rent-Seeking from Recent Experience, David G. Tarr, *The World Bank Economic Review*, 1994

In addition to the paper summarized immediately above and my paper on the exchange rate regime (Tarr, 1990), this is the third paper I produced based on my work for the World Bank Country Economic Memorandum for Poland. This paper provides empirical assessments of phenomena that are frequently discussed but rarely estimated: (i) the benefits of price decontrol; (ii) the extent of rent-seeking in price controlled markets, i.e., are the rents fully or partially dissipated in rent-seeking activity; (iii) the relative magnitude of the rent-seeking costs compared with the usual estimates based on narrow efficiency costs or "Harberger triangles;" and (iv) an estimate of the implicit subsidy to imports that the price controls represent. Since price controls lead to excess demand and shortages at the controlled price, those who receive the good under price control obtain a rent. Although theory tends to focus on full dissipation of the rents (Barzel, 1974), in this article, I show that rent-seeking, rent-dissipation and the welfare costs of price controls vary enormously, depending on the method of allocating the good under the price control.

With Polish color televisions, consumers who obtained a color television under price control, could legally sell it on the free market at about twice the price. That is, even though televisions in the shops were under price control, there was a free market price for resold televisions. The price controlled good was allocated based on queuing, a situation that appears to fit the well-known model of rent-seeking by Barzel (1974), where all the rents from the price control are dissipated, or lost to society, in rent-seeking queuing time. Taking into account the opportunity cost of queuing, the costs to consumers is the free market price of resold televisions, which exceeds the market clearing price if the price controls were lifted. My estimates include the high relative cost of rent-seeking, which leads to my estimate that the total costs to society were about ten times the more traditional estimates of efficiency losses of producers and consumers (based on Harberger triangles).

With automobiles in Poland, the official price of the least expensive Polish car, the 126p, cost an estimated 17.5 months of wages for an average Polish worker in December 1988. The car could be legally sold on the free market, where the price of the 126p was 63.5 months of wages. Thus, the value of the rents was 46 months of wages. Contrary to color televisions, the cars were allocated by a combination of a lottery system and an assignment system that I judged, on balance, did not result in rent-seeking or rent dissipation, i.e., no loss to society. Consequently, the welfare cost estimates are limited to the Harberger triangles of producers' and consumers' efficiency losses.

In this paper, I developed a theoretical model of these markets, in which consumers optimize their choice of goods in the economy, in the presence of a price control on one good, import competition and a consumption-leisure choice with

queuing for the price controlled good. I show that the price controls acted as an implicit subsidy on imports equal to 43 percent in the case of cars and 22 percent on color televisions. Although Polish authorities had no intent to subsidize imports, the price controls resulted in a substantial increase in import demand. These estimates mean that if the price controls on domestic cars were removed, the demand for imported cars would have to be subsidized by 43 percent to restore imports to the level under price controls. Similarly, if the domestic price controls on televisions were removed, to keep imports unchanged, imports of televisions would have to be subsidized by 22 percent.

**Chapter 12: The Terms-of-Trade Effects of Moving to World
Prices on Countries of the Former Soviet Union, David G. Tarr,
Journal of Comparative Economics, 1994**

Trade between the 15 republics of the former Soviet Union was an extension of the planning mechanism, and was dominated by lists of products that each republic was expected to provide to the rest of the Soviet Union. After the collapse of the former Soviet Union in the summer of 1991, trade that had been conducted as trade within a single country under central planning, became trade between 15 newly independent countries. The wide divergence between implicit prices of internal trade and world prices evoked fears of large terms of trade gains and losses among the newly independent states. The key to the issue was the classification of goods into “hard” goods and “soft” goods. Russia, Turkmenistan and Kazakhstan exported primarily oil, gas and commodities. These goods were called hard goods since they could be sold (and were sold) in Western markets due to the small quality difference between them and the substitute products available in Western markets. On the other hand, countries such as Estonia, Latvia, Lithuania, Moldova and Belarus were exporting primarily machinery, equipment and food products to the other republics of the former Soviet Union. These goods were called soft goods, since they typically could not be sold in the West (or only sold at deep discounts) due to their perceived low quality compared to substitutes available in Western markets.

I provided the first estimates of the terms of trade changes for the conversion of the trade to world market prices. As expected, I estimated that the major oil and gas exporters would gain substantially from the terms of trade change. The estimated gains as a percent of their GDP are: Russia, 17.7 percent; Turkmenistan, 19.5 percent; and Kazakhstan, 7.4 percent. On the other hand, the oil and gas importers were estimated to be significant losers from the terms of trade changes. The largest losers and the estimated losses as a percent of their GDP are: Estonia, 12.7 percent; Latvia, 11.3 percent; Lithuania, 9.7 percent; Moldova, 16.1 percent; Armenia, 7.6 percent.

Reactions to the terms of trade losses varied enormously among the countries that lost. The three Baltic States moved to redirect their trade to the West as quickly as possible; they became members of the European Union in 2004. Most of

the remaining 12 states negotiated intergovernmental barter agreements that partially resurrected the planned trade of the former Soviet Union. These agreements diminished and were phased out over time. The price of natural gas that Russia sells to Ukraine has been a major point of controversy between Russia and Ukraine to this day. The issue led to the imprisonment (and eventual release) of the former Prime Minister of Ukraine, Yulia Tymoshenko, for ostensibly negotiating a bad deal on gas prices. On the other hand, Belarus stayed linked to Russia and for many years was able to obtain oil and gas at Russian internal prices. For many years, Belarus was able to refine and sell refined oil in the West, thereby reaping profits from obtaining oil at below world market prices from Russia.

Chapter 13: The Terms-of-Trade Effects from the Elimination of State Trading in Soviet-Hungarian Trade, Gabor Oblath and David G. Tarr, *Journal of Comparative Economics*, 1992

Trade between the former Soviet Union and its partner countries in the Council of Mutual Economic Assistance (CMEA), also sometimes known as COMECON, was based on a network of large inter-governmental barter agreements. The system was an extension of the state planning mechanism of the former Soviet Union to its international trade with its partner countries in the CMEA. After an intergovernmental negotiation, the member governments of the CMEA agreed to deliver long lists of their own products (with quantities) to the other member governments in return for long lists of goods they would receive from the other countries. The goods were priced in a unit of account, known as “transferable rubles.” The transferable ruble had no physical presence and the prices differed significantly from world market prices. On January 1, 1991, the CMEA ceased to exist, and this trade was abruptly switched to a market basis, with trade becoming based on hard currency. This was known as the “switch-over.”

The Government of Hungary requested a study by the World Bank to assess consequences and assist with a strategy on how to adapt to the switch-over. The team I led, comprised of Wilfred Ethier, Areh Hillman, Constantine Michalopoulos, Gabor Oblath and Istvan Abel, produced the report World Bank (1991). I subsequently summarized the results of the full report in Tarr (1992). Perhaps most important for my subsequent work was that Constantine Michalopoulos educated me on the problem of “payments unions,” and we co-authored a chapter in our report to the Government of Hungary on this subject (a version of this chapter subsequently appeared as Michalopoulos and Tarr, 1992a). We realized our collaboration was very synergistic, and over the next 8–10 years, we worked together on many papers on the trade and payments arrangements for the newly independent states of the former Soviet Union.

A key issue was the terms of trade change. It was assumed that the former Soviet Union subsidized its trade with its Eastern European partners in the CMEA and, consequently, the switch to market prices settled in hard currency would constitute

a terms of trade loss for the Eastern European countries at a time when they were struggling to make the difficult transition to market economies. The key to the issue was the classification of goods into “hard” goods and “soft” goods as discussed above.

For Hungary, Gabor Oblath and I estimated the terms of trade loss at \$1.7 billion based on 1990 data, which was 4.6 percent of Hungarian GDP. The terms of trade loss contributed significantly to the real GDP decline and hardship in Hungary (and other CMEA countries in Eastern Europe) in the first few years of their transition to a market economy. But the loss of markets in the former Soviet Union and other CMEA countries may have been even more devastating.

One should not conclude from these estimates that countries such as Poland and Hungary had a long run welfare gain as a result of our estimates of terms of trade subsidies from the former Soviet Union. As other authors have pointed out, the dynamic efficiency losses of being in the Soviet bloc, including the CMEA, outweighed the terms of trade gains for these countries. Strong evidence of that is a comparison of the following Western versus Soviet bloc country pairs that had approximately equal per capita incomes and institutional conditions pre-World War II: West Germany versus East Germany; Austria versus Hungary; and Finland versus the Baltic States of Estonia, Latvia and Lithuania. In all cases, the incomes of the Western countries were several multiples or more of their Soviet bloc comparator country by 1989.

Chapter 14: The Merits of Dual Pricing of Russian Natural Gas, David G. Tarr and Peter D. Thomson, *The World Economy*, 2004

This paper was extremely controversial. It was written to help clarify an issue that had become bitter in the negotiations between Russia and the European Union as part of Russia's efforts to join the World Trade Organization. Russia's efforts to join the World Trade Organization (WTO) began in June 1993, when it applied to become a member of GATT, the predecessor organization to the WTO (which was born in 1995). Under the Presidency of Boris Yeltsin, there was very little real progress in the accession negotiations of Russia. When Vladimir Putin became President, he initially energized the accession efforts of Russia, and real progress began to be forged. Russia was obliged to sign a “bilateral market access” agreement with all members of the WTO who wished to negotiate one, and in 2002, Russia was negotiating a bilateral market access agreement with the European Union. In these negotiations, the European Union (EU) was insisting on a unique price of Russian natural gas (net of transport costs) for Russia's exports and domestic industrial use. Russia's export price for natural gas to Europe was five to six times its domestic price, a practice referred to as “dual pricing” of natural gas. The EU alleged that dual pricing provided an unfair advantage to Russian exporters who use natural gas as an input. Russia perceived the request as imposing large costs from reduced profits on exports if they had to implement unique pricing by lowering

export prices or else unemployment and misallocated resources in Russia if they had to implement unique pricing by raising domestic prices. President Putin declared that the demand to unify export and domestic natural gas prices was a deal breaker and Russia would not join the WTO under this condition. The issue became so heated that the Russian WTO accession process became stalled over this issue and threatened to derail.

I believed that the request of the EU for a unique price was based on a fundamental misconception of what was in Russia's interest, and that this misconception had been shared by the International Financial Institutions. It had been long-standing advice of the World Bank and the International Monetary Fund (IMF) to Russia that it should impose unique prices for exports and domestic goods. If Russia did not have monopoly power on its exports (that is, if its export prices were not impacted by the quantity of its exports), that is the correct economic policy. Without monopoly power, dual pricing implies its export earnings will then be worth more than the value of the product in domestic use. Based on this logic, economic advisors in the European Commission had advised their negotiators that pushing for a unique price of Russian natural gas (net of transport costs) would benefit Russia. The problem with the logic is that Russia had a large market share in the natural gas market of Europe and possessed substantial market power on its sales of natural gas there. It could not shift a substantial portion of its domestic sales (which were about three times its export sales to Europe) to Europe without suffering a substantial fall in its export price. In cases of such market power, the exporter needs to set "marginal revenue equal to marginal costs." But given the offsetting consumer interest in the Russian market, the home price of a monopolist should be regulated to equal long run marginal cost of production. This indicates that dual pricing of natural gas was in Russia's interest. In this paper, Peter Thomson and I estimated that if Gazprom were to sell its natural gas at long run marginal costs (the appropriate domestic price for Russia) plus transport costs, Gazprom would lose between \$5 and \$7.5 billion per year. This was about 2 percent of Russian GDP at the time.

Given how controversial the paper was, and that we clarified that the demand of the EU in the negotiations of a unique price for natural gas would be very costly to Russia, the paper was reviewed by multiple Directors, Vice-Presidents and Chief Economists in the World Bank, as well as by the International Monetary Fund. The key point of the paper, that dual pricing was in Russia's interest, remained. We have been informed that the paper was tabled by the Russian side in its bilateral market access negotiations with the EU, that the EU had the paper reviewed by the OECD, and that the paper was instrumental in resolving the natural gas pricing issue in the negotiations. The EU and Russia signed a bilateral market access agreement within a few months of the paper being delivered to the two parties. The chief EU negotiator publicly acknowledged the difficulty of the negotiations and that important issues of market access remained unresolved (especially in services), but he was leaving the unresolved issues for the U.S. to negotiate.

Chapter 15: Russian Trade and Foreign Direct Investment Policy at the Crossroads, David G. Tarr and Natalya Volchkova, in *The Oxford Handbook of the Russian Economy*, Michael Alexeev and Shlomo Weber (eds.). Oxford University Press, 2013

Russia joined the World Trade Organization (WTO) in the summer of 2012. The Russian accession negotiations were the longest in the history of the WTO. The Working Party on accession of the Russian Federation to the WTO was established on June 16, 1993; it comprised about 60 countries and was the largest Working Party in the history of the WTO.

My own work on Russian WTO accession began early in the new millennium during the first Administration of President Vladimir Putin. Under former President Boris Yeltsin, WTO accession in Russia languished, highlighted by the failure of Russia to even present its initial offer on services. When Putin first took office (first as acting President on December 31, 1999 and then as the elected President in 2000), he energized Russia's accession efforts so that Russia actively sought membership in the WTO; WTO accession was seen as part of a strategy of an open economy model of economic development. As world energy prices rose over the subsequent 7–8 years, Putin and some others in Russia began to doubt the usefulness of the WTO. Some in the Russian Government perceived diversification of the economy away from energy and raw material dependence as more important. We discuss in this paper several industrial policy and import-substitution-industrialization measures Russia employed, some of which were constrained by WTO limitations.

This paper summarizes the estimates of several studies my co-authors and I undertook regarding what Russia will get from WTO accession and why (Jensen, Rutherford and Tarr, 2006; 2007; Rutherford and Tarr, 2008, 2010; Rutherford, Tarr and Shepotylo, 2005; 2006). Key findings were: we estimated that Russia will gain about \$53 billion per year in the medium term from WTO accession and \$177 billion per year in the long term, due largely to its own commitments to reform its own business services sectors; there would be virtually no losers from WTO accession as virtually all households would gain something from WTO accession; and those regions of Russia that are more attractive to foreign direct investment would gain the most, which implies that the Urals and Siberia would gain the least.

In this paper, we show that Russian commitments represent a liberal offer to the members of the WTO for admission, but they are typical of other transition countries that have acceded to the WTO. Following the breakup of the Soviet Union, Russia allowed free emigration generally. Consequently, the Jackson-Vanik Amendment in the U.S., which required that the President of the U.S. annually certify that Russia was allowing the emigration of Jews in order to receive most-favored nation tariff status in the U.S., was a major irritant to Russia. We explained why Russian WTO accession would result in the elimination of the Jackson-Vanik Amendment against Russia, a prediction that proved valid. We discuss Russian policies to attract foreign direct investment, including an assessment of the impact of

the 2008 law on strategic sectors and the increased role of the state in the economy. We argue that the various state interventionist measures Russia is employing to achieve diversification of its economy are not likely to be successful. Russia has a serious problem with its institutional environment for business development and it will have to improve on corruption and develop institutions necessary to improve the business climate to achieve the Government's objective of diversifying the Russian economy. In this regard, the progress that Russia has made on the Doing Business Index of the World Bank in 2013–2015 is encouraging.

Part 3: Multilateral, Dynamic and Environmental Issues in International Trade using Computable General Equilibrium Models

In this section, we reprint six studies that employ computable general equilibrium (CGE) models, but, unlike the papers in my first volume in this series (Tarr, 2014), these are not applied CGE studies of single economies or regions. These papers are conceptually very innovative and include some of my most widely cited papers.⁸ Paper 3.1, (Harrison, Rutherford and Tarr, 1997) became the classic reference on the impact of the Uruguay Round. Paper 3.2, Rutherford and Tarr (2002), was theoretically very innovative as the first model to assess the welfare effects of endogenous growth models. Paper 3.3, (Rutherford and Tarr, 2003) shows that dynamic models, without endogenous growth, do not yield larger estimates of welfare gains from trade liberalization. Paper 3.4, (Markusen and Rutherford and Tarr, 2005) was the theoretical foundation for several of my subsequent papers, including the modeling papers on WTO accession in Russia and Kazakhstan. The latter, fully developed applied models have been applied by other authors, including Veronika Movchan in Ukraine and Natalia Turdyeva in Russia. In paper 3.5, Böhringer, Rutherford, Tarr and Turdyeva (2015), we examine the interaction of trade and environmental policies. We show that properly accounting for the role of market structure not only produces estimated gains that differ from simpler perfectly competitive models, but also may lead to opposite conclusions.

Chapter 16: Quantifying the Uruguay Round, Glenn W. Harrison, Thomas F. Rutherford and David G. Tarr, *The Economic Journal*, 1997

The Uruguay Round agreement was responsible for the creation of the World Trade Organization. As such it is clearly one of the most important trade agreements in history. The World Trade Organization incorporated the GATT, with its rules on goods trade, and extended the multilateral system into services and intellectual

⁸Paper 3.1 is my most cited paper, with 573 professional citations as of February 2016. For full and updated citation data see my Google Scholar webpage: <http://scholar.google.com/citations?user=30hiaj8AAAAJ&hl=ru>.

property. Given its importance, the agreement generated a substantial number of computable general equilibrium (CGE) modeling efforts to estimate the impacts. In this paper, Glenn Harrison, Thomas Rutherford and I constructed our own CGE model with which we estimated the impacts with two primary objectives: (1) to assess the most important elements of the Uruguay Round, explaining the reasons particular countries gain or lose and why; and (2) evaluate several other CGE models that estimated impacts of the Uruguay Round or its important components, and explain why their results differ from ours. Because of its additional insights and explanations into the cause of the estimates and the comparison across different models, this paper became the classic reference in the literature on the impacts of the Uruguay Round.

In 1992 dollars, we estimated that the world as a whole would gain about \$96 billion annually in our static increasing returns to scale (IRTS) model and \$171 billion annually in our IRTS steady state model. However, the gains are concentrated in the industrialized countries, especially the United States, the European Union and Japan. In our static model, the United States gains \$13 billion, primarily from removal of the quotas on textiles and apparel products due to the dismantling of the Multi-Fiber Agreement. The European Union gains \$39 billion, primarily from the reduction of its agricultural subsidies. And Japan gains \$17 billion, primarily from the reduction of its own high protection in agriculture.

The overall explanation is intuitive: it is the industrialized countries, especially the United States and the European Union that “gave up” the most in the Uruguay Round in the (misleading) mercantilist sense. In other words, these countries are reducing policies that are very costly in terms of foregone welfare to themselves, most notably agricultural distortions and their import quota protection in textiles and apparel through dismantlement of the Multi-Fiber Arrangement (MFA). On the other hand, developing countries reduce agricultural distortions relatively less (although the reduction of production subsidies is important for some food importing countries) and do not restrict imports under the MFA. The only general exception is that developing countries reduce protection in manufactures by more than OECD countries, since OECD countries have relatively lower benchmark protection on average in this area. Alan Winters has characterized these results as WYDIWIG: “what you do is what you get.”

In fact, we find that some developing countries will be net losers from the Uruguay Round in the short-run. The comparative static losses for developing countries derive primarily from two effects: (1) the reduction of agriculture subsidies in the United States, European Union and EFTA (which results in increases in food prices for some net food importing countries); and (2) MFA liberalization induces losses for some developing countries due to increased competition in industrialized country markets that drives down prices eliminating the MFA quota rents that many OECD countries paid to developing country exporters; and there is a loss of market share for the less efficient developing country clothing exporters. The more efficient clothing exporters, like China, gain market share. So some of the less

efficient developing country producers are hit twice: once by the loss of quota rents and second by the loss of market share in competition with more efficient suppliers.

As the poorest region in the world, we focus on sub-Saharan Africa, which is among the regions that lose in the short run. African trade negotiators were “successful” in playing the mercantilist game of extracting concessions from the rest of the world without liberalizing their trade at all. Losses to Africa then follow from higher food import prices from subsidy reduction in the industrialized countries and lower textile and apparel prices on their exports from the elimination of quotas. We show, however, that high and non-uniform domestic taxation in agricultural products in Africa is the most important distortion in Africa. Africa can make enormous gains from reduction of these distortions.

What developing countries can do, however, is further reduce their own self-inflicted costs by reducing their trade barriers and other distortions further. The post-UR environment presents a more open global trading environment. Unilateral tariff reduction or the reduction in other distortions in developing countries will lead to a change in developing countries production and exports based on comparative advantage, and export expansion is less likely to be impeded by global protectionism. Moreover, in our long-run, steady state model, our estimates suggest higher income levels will lift almost all countries that lose in the short-run. This suggests that all countries at least have the potential to gain from the Uruguay Round.

Chapter 17: Trade Liberalization, Product Variety and Growth in a Small Open Economy: A Quantitative Assessment, **Thomas F. Rutherford and David G. Tarr, *Journal of International Economics*, 2002**

International trade economists have typically argued that an open trade regime is very important for growth and poverty reduction. This view has been based partly on neoclassical trade theory, partly on casual empirical observation that countries which remain highly protected for long periods of time appear to suffer significantly and partly on numerous empirical papers that find that trade or trade liberalization is beneficial to growth.⁹ A troubling problem is that the numerical modeling estimates (including computable general equilibrium estimates) of the impact of trade liberalization have generally found that trade liberalization increases the welfare of a country by only about one-half to one percent of GDP, gains which

⁹Of course, all aspects of the paradigm that trade or trade liberalization leads to faster growth have been subject to criticism. Regarding the econometric evidence, Rodriguez and Rodrik (2001) have questioned: (i) causality (does trade cause growth or do countries that grow faster trade more); (ii) is trade liberalization measured properly in the studies; and (iii) is growth caused by other policies that changed simultaneously with trade liberalization. However, after developing an instrumental variable for trade that addresses the causality issue, Frankel and Romer (1999) find that ordinary least squares does not overestimate the positive impact of trade on growth. And Dollar and Kraay (2004) addressed all three criticisms and conclude that trade causes growth and does not systematically increase inequality, so, on average, trade reduces poverty.

are very small in relation to the paradigm or the econometric estimates. For many years authors have claimed that the welfare gains from trade liberalization would be much larger if the dynamic impact of trade liberalization were taken into account, but prior to this paper, there were no estimates available from numerical models with a micro-theoretical foundation that would provide credible larger estimates of the welfare gains from trade liberalization.

The seminal paper of Paul Romer (1990) provided a micro-theoretical foundation for how policies could influence growth and regenerated interest in growth models, known as endogenous growth theory. His paper, as well as several others, including Rivera-Batiz and Romer (1991), Grossman and Helpman (1991) and Segerstrom *et al.*, (1990), showed that trade liberalization increases economic growth.¹⁰ Even these latter models, however, did not show that trade liberalization has a large positive impact on welfare. That is, due to the complexity of the models, the theoretical literature necessarily focused on a comparison of the steady-state growth paths. The theoretical literature does not derive the dynamic adjustment path, the time it takes to converge to the new steady-state path, and does not evaluate the adjustment costs or foregone consumption necessary to achieve the new higher steady-state growth path. That is, even if the theoretical endogenous growth literature has shown that trade liberalization results in a new higher steady-state growth path, there could be very small welfare gains if it takes a long time to reach the new growth path and there are large adjustment costs in the transition. In this paper, Thomas Rutherford and I were the first to derive the dynamic adjustment path in a Romer style endogenous growth model; this allowed us to numerically evaluate the welfare effect and adjustment costs during the transition.

Our approach follows Romer (1994), who emphasized that proper modeling of the impact of trade protection on the reduction in the number of available varieties of goods and services is crucial to properly quantify the welfare impact of trade liberalization. We employ the standard Dixit-Stiglitz-Ethier mechanism. Large welfare gains in the model arise because the economy benefits from increased foreign varieties.

Some of our most important results are as follows: with lump sum revenue replacement, reducing a tariff from 20% to 10% produces a welfare increase of 10.6% of the present value of consumption in our central model (in terms of Hicksian equivalent variation over the infinite horizon). Systematic sensitivity analysis with over 34,000 simulations in this model showed that there is virtually no chance of a welfare gain of less than 3% but a 6.6% chance of a welfare gain larger than 18%. We investigated several modeling variants and performed a sensitivity analysis on all the key parameters. We found that the welfare estimates for the same tariff cuts ranged up to 37.4% with capital flows (where the economy can access international

¹⁰There have also been models that showed that trade openness could be immiserising.

capital markets, borrow in the early years and pay back in later years), and down to 4.7% with our most inefficient replacement tax — a tax of capital. The latter result shows, importantly, that even the very inefficient tax on capital is superior to the tariff. Doubling the size of the tariff cuts, to better reflect the substantial liberalizations of many developing countries in the past 30 years, resulted in roughly doubling the estimated welfare gains.

Although estimates of welfare gains from trade liberalization have been widely seen as too small, some may question whether our estimates are too large. To put these numbers in perspective, we derived the relationship between a permanent increase in the steady state growth rate and equivalent variation. A welfare gain of between 10 and 35% of consumption (as we have estimated) corresponds to a permanent increase in the growth rate of between 0.4 and 1%. A policy induced change in the growth rate of this magnitude is quite plausible in the context of the actual long term per capita growth rates over the 25–30 year period beginning in 1962. For example, Sachs and Warner (1995) estimate that open economies have grown about 2.45% faster than closed economies, with even greater differences for open versus closed economies among developing countries.

The results clearly support the paradigm that trade liberalization can lead to significant income increases, and the results are consistent with estimated gains of trade liberalization from cross-country growth regressions. But the results also illustrate the crucial importance of complementary reforms to fully realize the potential gains from the trade reform. Notably, with the ability to access international capital markets, the gains are more than tripled and inefficient replacement taxes will significantly reduce the gains. The tariff in our model, however, is more inefficient than even the most inefficient alternate replacement tax, the tax on capital.

Chapter 18: Regional Trading Arrangements for Chile: Do the Results Differ with a Dynamic Model? Thomas F. Rutherford and David G. Tarr, *Integration and Trade*, 2003

As mentioned above, despite small model estimates of the gains from trade liberalization, international trade economists have typically argued that an open trade regime is very important for economic development. (e.g., The World Bank, 1987). Authors have claimed that the estimated welfare gains from trade liberalization would be much larger if the dynamic impact of trade liberalization were taken into account (see Thomas, Nash *et al.*, 1991).

We show in this paper, however, that *traditional dynamics* are not sufficient to increase the estimated welfare gains. We construct a fully dynamic computable general equilibrium small open economy model with intertemporal optimization in the style of Ramsey. Our principal result is that our dynamic model does not produce welfare estimates significantly different from a comparative static model. Rutherford and I have shown in the paper immediately above that if the dynamic model contains

endogenous growth features, the estimated gains are very substantial and consistent with the paradigm that trade liberalization may significantly contribute to growth. Without endogenous growth, however, the increases in the long run capital stock that are possibly induced by trade liberalization come at the expense of foregone consumption and reduced welfare during the transition. Since the capital stock is already optimized on the steady-state path based on the consumption-investment tradeoff, trade liberalization that induces a larger capital stock does not necessarily improve welfare. Therefore, converting a perfectly competitive comparative static model to a perfectly competitive dynamic model will not, in general, result in an increase in the estimated welfare gain of trade liberalization.

Due to trade diversion, international trade economists have often cautioned against assuming that regional trade agreements will increase welfare. For example, due to trade diversion effects, Harrison, Rutherford and Tarr (2002) have estimated that a customs union between Chile and MERCOSUR would be welfare reducing for Chile. Some experts, however, argue that estimates such as those of Harrison, Rutherford and Tarr would be reversed if the dynamic effects of the regional agreements were taken into account. We estimate, however, that the welfare losses for Chile of a customs union with MERCOSUR are larger (in absolute value) in our dynamic small open economy model than in the comparative static small open economy model. Our second result then is that it is possible for a dynamic model to produce welfare estimates for a preferential trade area that are welfare inferior to those from a comparative static model. Thus, regional trade agreements that are immiserizing (welfare reducing) when evaluated in a comparative static framework do not necessarily have improved evaluations in a dynamic framework and these evaluations can be worsened.

A third result is that an unadjusted comparative steady state model may significantly overestimate the gains from trade liberalization. In this paper we show that the usual comparative steady-state model overestimates the welfare gains rather substantially, by about a factor of 2.5 in the case of the Chile-NAFTA agreement. The first step in building a fully dynamic model is to construct a steady-state equilibrium growth path. This requires reconciliation of data on the value of capital earnings and the value of investment with depreciation, growth and interest rates. It has been well documented that data in input-output tables substantially overestimate the value of capital earnings. Then the value of capital's earnings are typically too large for consistency of a steady-state growth path in a dynamic model; this requires the reduction of capital's earnings and the implied capital stock in the initial data. In what we call our "calibrated comparative steady-state model," we impose the same reduction in the earnings of capital and the implied capital stock in the benchmark equilibrium as we did in our fully dynamic model. With a lower initial capital stock, the induced increase in the capital stock from the trade policy shock is also smaller, so that the gains from the calibrated comparative steady-state model are less than in the unadjusted comparative steady-state model.

Chapter 19: Trade and Direct Investment in Producer Services and the Domestic Market for Expertise, James Markusen, Thomas F. Rutherford and David G. Tarr, *Canadian Journal of Economics*, 2005

Services now constitute about 70 percent of global GDP.¹¹ Moreover, foreign direct investment (FDI) flows have shifted toward services, and now constitute almost half of total FDI flows in developing countries.¹² Despite these facts, most computable general equilibrium models ignored liberalization of barriers in services in general and barriers against foreign investors in services in particular. In this paper, Thomas Rutherford and I collaborated with one of the profession's leading modelers of services and foreign direct investment, James Markusen. We were interested in the general problem of modeling services and foreign direct investment and doing so in a manner that reflected the growing evidence that access to services increased the productivity of businesses. But we also were beginning our work on Russian WTO accession and it was evident that services liberalization was a major problem for Russia. Despite negotiating its WTO accession from 1994, by the year 2000 Russia still had not tabled its initial services offer to its Working Party on WTO accession.

Although we needed to extend the model in some important and non-trivial dimensions (explained in Tarr, 2013) for real economy applications, the model of this paper became the basis of several of our applications, and also of other independent authors, to real economies. Six of these journal articles were reprinted in my first volume in this series (Tarr, 2014). In this paper, we developed a small stylized computable general equilibrium model of an open economy. Services are modeled as intermediate inputs produced under conditions of monopolistic-competition, where users of the services receive a lower quality adjusted price of the services if there are more services varieties (the Dixit-Stiglitz externality). The model is very transparent and helps provide intuition to the more complicated full CGE models. The transparency partly explains why the paper is widely cited, and others have built CGE models based on the theory in this paper.¹³

We show that liberalization of restraints on foreign providers of services can provide very large gains, gains sufficiently large enough to reverse comparative advantage in final goods if one of the final goods intensively uses services. The source of these large gains is that additional intermediate service firms increase the productivity of the final goods sector that uses these firms' services as intermediate inputs. Although foreign services inputs are partial-equilibrium substitutes for domestic skilled labor, the results show that they may be general equilibrium complements. Finally, we show that contrary to the Stolper-Samuelson theorem, due

¹¹Francois and Hoekman (2010, 644).

¹²See World Bank, *Global Development Finance*, 2004.

¹³In addition to the applications by Turdyeva and Movchan mentioned above, see, for example, Dee *et al.*, (2003) and Brown and Stern (2001).

to the Dixit-Stiglitz externality, it is possible that the real price of all factors of production rises.

Chapter 20: Market Structure and the Environmental Implications of Trade Liberalization: Russia's Accession to the World Trade Organization, Christoph Böhlinger, Thomas F. Rutherford, David G. Tarr and Natalia Turdyeva, *Review of International Economics*, 2015

Computable general equilibrium models are widely used to assess the prospective impacts of environmental regulations and trade policy changes. However, virtually all studies of the impact of environmental regulations have employed perfect competition-constant returns to scale models, and thereby omit potentially important impacts of imperfect competition, where endogenous productivity effects affect the results. In this paper, we extend our ten-region (CGE) model of Russia by incorporating data on greenhouse gas emissions and six other pollutants by industry and region of Russia as well as through personal consumption. Our model contains increasing returns to scale (IRTS), monopolistic competition, foreign direct investment in business services and endogenous productivity effects from additional varieties of goods and services that are produced under monopolistic competition. Our model is the first of its kind to examine the environmental implications of trade policy.

We find that, without additional environmental regulation, the environmental impacts of Russia's accession to the World Trade Organization (WTO) would increase emissions of carbon dioxide and the six other pollutants we model. We decompose the estimated increase in emissions into the technique, composition and scale effects. We find that since WTO accession allows better access to foreign technologies in goods and services, WTO accession should lead to lower carbon dioxide emissions from the technique effect. On the other hand, in the case of Russia, WTO accession leads to an expansion of dirty industries, including chemicals, ferrous and non-ferrous metals; thus we estimate that WTO accession would increase carbon dioxide emissions from the composition effect. We find that the scale effect is the most important quantitatively; we estimate that WTO accession will increase the output of the Russian economy, and, other things equal, carbon dioxide emissions increase with output. We also develop a perfect competition model consistent with the same data. Due to endogenous productivity effects of our IRTS model, the scale effect is larger than in the perfect competition model, so we find that the harmful environmental impact of WTO accession on carbon dioxide emissions is greater in our IRTS model than in a model of perfect competition.

The international evidence indicates, however, that trade liberalization leads to lower environmental emissions; this is primarily because trade liberalization tends to be accompanied by greater environmental regulation, possibly due to larger incomes from trade liberalization leading to a demand for environmental regulation.

Consequently, we consider three regulatory policies to reduce carbon dioxide emissions by 20 percent: (i) market based cap and trade; (ii) emission intensity standards; and (iii) energy efficiency standards. All three policies come at the cost of lost welfare. As expected, we find that cap and trade is the most efficient policy (least cost in lost welfare) for carbon dioxide emissions, since the marginal cost of emission reduction is equalized across all users. Emissions intensity standards are less efficient than cap and trade in part since there is no incentive to switch sectors, but we find that the costs of emissions intensity standards are drastically lower than the costs of energy efficiency standards, as the former operate more closely to the relevant margin for emissions reduction.

We simulate the impacts of *combining* Russia's WTO accession with each of these three environmental regulations to reduce carbon dioxide emissions. In our IRTS model, we estimate that there are net welfare gains to Russia of WTO accession combined with any of these three environmental regulations. In our CRTS perfect competition model, however, we estimate net gains to Russia of WTO accession only in the case of the most efficient environmental regulation (cap and trade). Thus, the choice of the model is crucial as even the sign of the impact is dependent on the model. While our results are consistent with earlier studies that suggest increased estimates of pollution with IRTS models (absent offsetting environmental regulation), our analysis indicates that there are greater gains available when taking IRTS into account, which allow for net gains from trade liberalization after environmental regulation to produce a cleaner environment.

Chapter 21: Welfare Costs and Rent Premia When Quotas are not Transferable, Jaime de Melo, Alex Pfaff and David G. Tarr, *European Economic Review*, 1994

Either through quotas on imports or rationing of foreign exchange, rationing of imports has occurred frequently in many transition or developing countries. Two broad patterns of allocating licenses have been employed. The most common procedure is to allocate the license to import or the license for foreign exchange, but the license holder is not free to transfer the license to an alternate user. The less common method is to allow the license holder to transfer the license.

When trading of the license is permitted, licenses should go to those who value it most highly, so the marginal value of all users should be equalized (provided domestic agents are the initial quota rights holders). Then the quota scheme should produce welfare results broadly comparable to the "equivalent tariff" that constrains imports by the same aggregate amount. When transfers of the quota rights are prohibited, mutually advantageous trades do not occur resulting in different users with unequal marginal valuations. Regarding the qualitative result, economic theory is clear that prohibiting trade is welfare inferior. But little was known about the quantitative answer to the question of by how much is transferability superior?

In this paper we use data on the South Korean economy to provide some quantitative estimates of by how much prohibiting trades reduces welfare when we ration all users proportionately. The answer depends on by how much the elasticity of demand diverges for different users of the rationed products. If all users have identical elasticities of demand for the rationed product, the marginal valuations of different users vary together (for the same percentage reduction), yielding little or no gains from trading. Trading would produce gains even in this case if the rationing were not done proportionately. When we impose different elasticities across sectors, the costs of quotas are more than 10 percent larger than when trading is prohibited.

Part 4: U.S. Trade Policy in Autos and Steel

Due to the free-rider problem, consumer interests are not typically represented in decisions to impose import protection. So the industry and its union are typically unopposed in lobbying for import protection. The managers of the U.S. Federal Trade Commission (FTC), as part of the FTC's mandate to represent the interests of consumers and the broader economy, decided to devote resources to interventions before other U.S. Government agencies in support of consumers and the interests of the broader economy. Cases involving protection from international competition were an obvious area (but not exclusive area) where the FTC began to get involved.

In order to obtain quantitative estimates of the costs and benefits to the economy of import protection, we built on the work of Corden (1957). W. Max Corden began his voluminous work on trade protection by developing the theoretical framework for estimating the costs of trade restrictions under perfect competition. My first work in this area was in the highly contentious case of "trigger prices" discussed below. It was part of the multi-year team study on the U.S. steel industry and its international rivals (Duke *et al.*, 1977), which led to numerous follow-up studies on a variety of steel industry related topics, see Tarr (1979; 1984; 1985; 1985a; 1987; 1987a; 1988; 1990b), de Melo and Tarr (1990; 1992; 1993).

While we were at the U.S. Federal Trade Commission, Morkre and I did a series of studies of the costs of trade restrictions in the United States. These studies were typically done in a policy context, frequently involving testimony before the U.S. International Trade Commission or Department of Commerce (together with attorneys from the U.S. Federal Trade Commission). In some cases, such as the automobile study reproduced here, the study was provided to the Council of Economic Advisors, when the Council was responsible for making a recommendation to the President on what action to take. Along with Stephen Magee (1972), these studies were the first to quantify the costs of trade restrictions.

Morkre and I produced two monographs in which we collected these case studies (Morkre and Tarr, 1980; Tarr and Morkre, 1984). The case studies provide considerable intuition into the microeconomics of resource allocation. Consequently, the case studies were very popular with teachers of international economics and most

of the textbook writers in the field of international economics reproduced some of the case studies. This includes the textbooks of Ethier (1988), Salvatore (1987) and Lindert and Pugel (1995). Morkre and Tarr (1980) also contained two methodology chapters. Many professors of international economics found these methodology chapters useful to teach from since the material, at least when it first came out, was not typically available elsewhere. Below I reproduce the steel trigger price and the auto studies, and discuss the very interesting and controversial policy contexts of both.

When I moved to the World Bank, Jaime de Melo and I then constructed the first computable general equilibrium (CGE) model to analyze trade policy in the United States. We focused on U.S. quotas on steel, autos and textiles and apparel. Our most important result (de Melo and Tarr, 1990) was that, since the quotas in these sectors transfer rents to foreigners, in terms of welfare costs of the quotas, the “equivalent tariff” in terms of welfare costs would be almost 20 percent. This means that, in terms of welfare costs, the quotas undid decades of multilateral tariff reductions under the GATT; they brought us back to the early post-World War II days in terms of welfare costs of the U.S. economy. We published four articles and our book analyzing these quotas — see de Melo and Tarr (1990; 1992; 1993; 1996) and de Melo, Pfaff and Tarr (1994).¹⁴ The textbook of Krugman-Obstfeld (1993) reproduced our automobile case study based on the CGE model in Tarr (1989); but Krugman-Obstfeld was the only one of the international trade textbooks to use the general equilibrium case study, in part I believe, because the partial equilibrium applications are easier for students. In this section, we reproduce de Melo and Tarr (1993), which examines industrial policy for the steel industry with imperfect labor and product markets, and challenges the view that union power provides a rationale for industrial policy through import protection. I also reproduce an applied paper which was the first to numerically show that import quotas that give the exporter quota rents would likely benefit the exporters and an empirical study of the alleged “cyclical dumping” in steel.

Chapter 22: The Costs of the Voluntary Restraint Agreement on Japanese Automobiles, David G. Tarr and Morris Morkre, in *Aggregate Costs to the United States of Tariffs and Quotas on Imports: General Tariff Cuts and Removal of Quotas on Automobiles, Steel, Sugar, and Textiles*, U.S. Government Printing Office, 1984

This paper was written when the U.S. automobile industry was petitioning the U.S. Government for an extension of the voluntary export restraints (VERs) on Japanese automobiles. In the spring of 1981, under pressure from the United States

¹⁴Our book, de Melo and Tarr (1992), has been cited 442 times as of December 2015. An earlier version of the book (Tarr, 1989) appeared in which I focused on the constant returns to scale version of the model.

Government, the Japanese Government announced that it would “voluntarily” restrain its exports of automobiles to the United States for three years at about 1.91 million autos per year. The action meant there was a quota on Japanese exports of autos to the U.S. until the spring of 1984. Crucially, as with all VERs, the quota was administered by the government of the exporting country, and allowed the Japanese auto producers to capture the rents from the higher prices on autos sales in the U.S. under the quota.

We estimated that the losses to the U.S. economy from the VERs were \$994 million in 1983 dollars, or \$3.6 billion in present value over four years of the VERs. The quota rents of the Japanese producers were \$824 million per year, and accounted for over 80 percent of the losses to the U.S. economy. Domestic producers were estimated to gain only \$115 million per year.

We estimated the adjustment costs of workers and the saving of adjustment costs is the benefit of the import protection. We then calculated that the cost-benefit ratio of the VERs was over twenty. That is, for each dollar of benefit from retaining the VERs, there was over twenty dollars of costs to the U.S. economy.

Given the importance that the U.S. Congress placed on job creation, we also estimated the number of jobs preserved in the automobile sector by the VERs. We found that the costs to the U.S. economy per job in the auto sector was about \$200,000 per job, per year. This \$200,000 per year per job estimate does not include the direct costs in wages and benefits of the workers.

A key reason for the high cost-benefit ratios and costs per job created estimate and the share of the losses to the U.S. economy relative to gains to domestic producers is how the U.S. administered these quotas. Unlike how developing countries typically administer quotas, the U.S. allowed the exporting country to allocate the quota rights, thereby allowing the foreign company exporters to capture the higher prices from the quotas. That is, the U.S. transferred the rents from the quotas to foreigners. Thus, “equivalent tariffs” that provide equal protection to the domestic industries would impose only 20 percent of the welfare costs to the U.S. economy. VERs were becoming very popular in industrialized countries in the 1980s, since they bought off the exporting country in the negotiations for protection by transferring the quota rents. Although VERs imposed much higher costs on consumers and the economy, consumer interests were typically not represented effectively in the lobbying for protection. In the Uruguay Round, the World Trade Organization made voluntary export restraints illegal, and eventually also eliminated the multi-fiber arrangement (MFA) in textiles and apparel.

About the time that our study came out there were two other studies on the auto quotas done by other agencies of the U.S. government (U.S. International Trade Commission and U.S. Department of Commerce). I was asked to critically review these studies by James Miller, then the Chairman of the U.S. Federal Trade Commission. Although both of these other studies argued against the extension of the auto quotas, the studies had a number of serious methodological flaws. Miller ultimately decided not to make my review public. His view was that though the Federal

Trade Commission might gain some political points for having the better study of auto quotas, in the end, the cause of opposition to the quotas would be damaged.

His judgement was prescient. William Niskannen was Chairman of the President Ronald Reagan's Council of Economic Advisors at the time. Niskannen explained that the cabinet was divided in 1984 when it met to get Reagan's decision on whether to extend the VERs. Niskannen argued for termination of the VER. He was supported by the Treasury Secretary and Secretary of State, but was opposed by the Commerce and Labor Secretaries. Niskannen indicated that the fact that there were three studies from different U.S. agencies all coming to the same conclusion, that the VERs imposed more costs than benefits on the U.S. economy, was a powerful argument that helped to carry the argument in the Cabinet. President Reagan decided to terminate the VERs.

Chapter 23: Summary and International Trade Policy for Steel,
David G. Tarr, Chapter 8 in *The United States Steel Industry*
and its International Rivals: Trends and Factors Determining
International Competitiveness, U.S. Government Printing
 Office, 1977

My first effort to estimate the costs of trade restrictions was in estimating the costs of trigger prices in U.S. steel. In 1977, at the FTC, we had been working for over two years on a major report of the international steel industry. It was expressly designed to assess the various hypotheses that had been offered to explain the decline of the U.S. steel industry relative to its international rivals and to discuss policies, including international trade policies, for the steel industry. The intent was to be ready to comment when the next occasion to discuss steel protection arose. Our report was in the final stages of preparation, when I was asked to be a member of a multi-agency Task Force convened by President Carter to determine how to respond to the request of the U.S. steel industry for a new round of import protection. Under-Secretary of the Treasury Anthony Solomon chaired the Task Force and initially indicated that steel protection need not be part of the solution. Solomon argued that Congress, despite the gestures of selected members of Congress, was loath to introduce a bill to impose steel protection, since any bill introduced that would protect one industry would steam-roll into a protectionist Christmas tree that all members would want the President to veto. Despite this, after several weeks the Task Force moved toward trigger prices and protection, and I was not invited back to further meetings when I asked several challenging questions about the trend of the discussions regarding protection.

Our report for the U.S. Federal Trade Commission (Duke, Johnson, Mueller, Qualls, Roush and Tarr, 1977) was just about ready to go to the publisher when the U.S. Administration announced its plan (from the Solomon Task Force) to offer **trigger prices** (also known as "reference prices") to the steel industry. Trigger prices are minimum prices, below which imports would be effectively blocked from entry into the U.S. by a higher than most-favored nation tariff. Although only the

U.S. Congress can set tariff rates, the legal rationale of the Administration was that this would be an expedited antidumping investigation. I proposed a last minute modification in our 600-page report on the steel industry (Duke *et al.*, 1977) and added five pages of modeling and estimates of the costs of the trigger price mechanism. The key to the story was that with trigger prices, foreign exporters capture the rents from the exports. Compared to a tariff that restrained imports by the same quantity, they are therefore significantly welfare inferior for the home country. Regarding rent capture, they act more like quotas on imports (with the licenses for the quotas given to foreigners) than tariffs. At the higher prices, the foreigners supply less but receive a higher price. The home Treasury loses the rents to the foreigners. The European Commission in the settlement of antidumping cases subsequently adopted the idea on a widespread basis, where it was called a “price undertaking.”

Our draft report was leaked, by a still unidentified source, to a reporter for the *New York Times*. Two weeks prior to Congressional Hearings on the trigger prices, the *New York Times* ran a lead story on its front page on our analysis of trigger prices. We were subsequently asked to testify before the Subcommittee on Trade of the House Ways and Means Committee where the analysis was very well received (see Folsom *et al.*, 1978). The Chairman, Sam Gibbons of Florida, who was not in favor of steel protection, concluded that he was happy there was some agency that was concerned about the budget of the US.

Some members of the Administration, such as the Chairman of the President’s Council on Wage and Price Stability, who worked on the Solomon Task Force and the design of trigger prices, were incensed by our analysis. They thought they had done the country a service by implementing trigger prices in lieu of quotas. Two years later, however, that same person admitted he had made an error in judgement, indicating the trigger prices were applied in a more protective manner than he had envisioned.

Looking back on the results of implementing the trigger prices and the subsequent protection provided to the U.S. steel industry, we can see that the U.S. economy paid a very significant price for this protection. In the end, it did nothing to help the industry survive in the long run and it may have hurt. In the short run, it cost the U.S. economy in excess of \$100,000 per job per year temporarily protected. See Tarr (1985a, 1988) for details.

Duke *et al.*, (1977) is available at the link provided in the references. Here I reproduce the final chapter entitled “Summary and International Trade Policy for Steel.” In addition to my estimates of the impact of trigger prices, this chapter summarizes the results regarding the hypotheses that explain the decline of the U.S. steel industry. The hypotheses in the literature were: (i) inefficient decisions by the U.S. steel industry regarding adoption of technologies;¹⁵ (ii) monopolistic pricing practices; (iii) cyclical dumping of steel products by foreign steel producers

¹⁵See Tarr (1985) for an elaboration.

(see the chapter below); (iv) subsidies by foreign governments to their steelmakers; and (v) changes in relative costs. We find that the evidence indicates that we should reject the first four hypotheses. We concluded that the explanation for the increase in the foreign market share in the U.S. was the change in relative costs in favor of foreign producers. The chapter also examines and rejects various arguments offered for import protection in the steel sector.

**Chapter 24: Industrial Policy in the Presence of Wage Distortions:
The Case of the U.S. Auto and Steel Industries, Jaime de Melo
and David G. Tarr, *International Economic Review*, 1993**

In theoretical work initiated by Brander and Spencer (1983; 1984; 1985), some authors argued that import protection or export subsidies would be justified based on strategic considerations in industries with excess profits that are highly concentrated on a global basis. These papers showed that in the presence of an international oligopoly, tariffs could increase a country's welfare by enabling excess profits to be shifted from foreign to domestic firms. These arguments were known as "strategic trade policy."

Despite its early popularity among theorists in the 1980s, profit-shifting as a basis for strategic trade theory came to be regarded as insignificant as a policy issue. One important reason is that there is doubt whether excess profits really exist (except in the very short term) in many industries worldwide. Although international rivalry between Boeing and Airbus in wide-bodied aircraft fits the conditions of the model, economists were not able to convincingly find a second industry that meets the conditions. Katz and Summers (1989, 1989a) argued that a stronger argument for industrial policy or strategic trade policy is based on wage distortions. The argument is based on the convincing evidence of the existence of wage distortions in the U.S. economy. This means that the marginal product of labor differs across sectors, and the economy would benefit from a reallocation of labor toward the sectors with a higher marginal product of labor (where wage premia exist). Then we are in a second best world where the provision of an export subsidy or import tariff to a wage premium sector may be socially beneficial if the conventional production and consumption distortion costs of tariffs or subsidies are outweighed by the reduction of labor misallocation costs.

In this paper we test this hypothesis in the U.S. auto and steel industries. Katz and Summers (1989b) have shown that after controlling for all factors that explain wages, auto and steel workers earn wage premia of about 27 and 26 percent, respectively. Unlike other sectors where wage premia may be explained by efficiency wages, the wage premia in autos and steel are more reasonably explained by union exploitation of monopoly power. We investigate the hypothesis under both perfect competition and two types of oligopoly market structures where scale economies are present (oligopoly with contestable markets; and oligopoly with free entry and conjectural variation on rivals output).

If the wage premia can be considered exogenous, then, as suggested by Katz and Summers, the costs of protection will be lower than in the absence of wage premia. But under most market structures, labor misallocation is too small to justify protection. More importantly, we have argued that the more realistic representation of autos and steel is one in which unions set wages facing a tradeoff between employment and the wage premium. Then, we find that the existence of wage premia may exacerbate the total costs of protection on two counts. First, protection drives up the wage premium and costs of the final product, which induces an increase in the demand for the imported product. If protection is by a VER or quantitative restraint, which has been a frequent instrument of protection, then the rent loss component cost will be greater than if there are no wage premia. Second, if unions place a relatively high weight on wages, the distortionary costs of protection can be higher than if there were no wage premia. Our conclusion then is that, generally, the evidence does not support the case for an industrial policy in high wage industries.

Reflecting considerations of this type, as well as political economy considerations, Krugman (1992), one of the principal authors of the strategic trade policy literature, has concluded that the risks of following strategic trade theory far outweigh the possible gains. A country might make small gains in some circumstances, but it is more likely to be misapplied and lead to large losses.

Chapter 25: Effects of Restraining Steel Exports from the Republic of Korea and Other Countries to the United States and the European Economic Community, David G. Tarr, *The World Bank Economic Review*, 1987

In this paper, I investigated the question of what is the impact on an exporting country of a quota on its exports, where the exporting country is able to capture the quota rents. "Voluntary export restraints" (VERs) had become very popular in the 1970s and 1980s. Countries, such as South Korea in this application, were threatened with the imposition of tariff protection if they did not "voluntarily" limit their exports. They were told, accurately, that the VERs would be better for their producers than the "equivalent tariff" that limited their exports by the same quantity, since their producers would obtain higher prices under a quota where they allocate the quota rights. Fearing a worse outcome for their producers, exporting countries typically agreed to the VER. Given the free-rider problem, consumer interests were typically unrepresented in lobbying for or against protection; so VERs were rather pernicious in that they bought off the only concentrated interest in opposition to protection, but did so at additional expense to the protecting country's consumers. Although quotas were illegal under the GATT, this instrument circumvented the GATT, since it was ostensibly "voluntary." Recognizing the problem, VERs were declared illegal with the formation of the WTO in the Uruguay Round.

Although it is obvious that the exporting countries are better off with a VER rather than an equivalent tariff, the deeper question is whether the exporting countries actually benefit from the quotas. Prior to this paper, there were no estimates that might provide insights into this question. In this paper, I developed a three region partial equilibrium model of trade in steel products to estimate the impact on an exporting country from the VERs. South Korea's exports to both the United States and the European Community were constrained by VERs. For South Korea, due to the VERs, it must shift production into less efficient activities at the margin and suffers production and consumption inefficiency losses in its home market. But it gains rents on sales in the VER constrained markets of the United States and the European Community. There is a third effect that is sometimes ignored, but is important: in third markets that are unconstrained, South Korea suffers a terms of trade loss from the quotas. That is, since South Korea sells less in the United States and the European Community, it diverts sales to third markets, which drives down the price of its exports in the third markets. The key result of the paper is that I find that South Korea gains from the VERs. Although this result may be surprising to some who focus on market access for developing countries, the experience of the OPEC cartel should provide intuition. In the 1970s, by forming a cartel and restraining its own exports, OPEC succeeded in raising oil prices and dramatically increasing its welfare by capturing rents on oil exports. It is irrelevant to the welfare calculation if the restraints are imposed by the exporting or importing countries.

When I execute sensitivity analysis with the elasticities of the model, we find some elasticities where South Korea loses. I do not regard these elasticities as likely. But the reason for the losses from the VERs in these scenarios is instructive: it is the terms of trade loss in third markets that causes the losses. Quantitatively, the terms of trade loss in third markets is more than 20 times larger than the inefficiency losses of South Korea in its home market. That is, the inefficiency losses in the home market do not constitute a basis for arguing that the VERs are welfare reducing for the constrained country in any set of elasticities I executed.

Chapter 26: Cyclical Dumping: The Case of Steel Products, **David G. Tarr, *Journal of International Economics*, 1979**

Faced with increased competition from foreign steel producers, especially Japanese and European producers, in the late 1970s U.S. steel producers filed a large number of antidumping cases asking for tariffs (called antidumping duties in these instances) to be applied against steel producers from Japan and Europe. Representatives of the U.S. steel industry made the claim that Japanese and European steel producers were "cyclically dumping." By this they meant that foreign steel producers lower the price of their exports relative to their domestic price cyclically to smooth out domestic demand. In this paper I empirically test this hypothesis and reject it.

First, for theory, I employ the well-known model of a price discriminating monopolist, which shows that export prices will be low relative to the domestic price if and only if the elasticity of demand for exports is high relative to the domestic elasticity of demand. The model, however, does not predict cyclical dumping. If there is a simultaneous decline in demand in both the home and export market, the model predicts a fall in the export price relative to the domestic price if and only if the elasticity of demand for exports rises relative to the elasticity of demand for the domestic good. So the answer is empirical.

For the U.S., Japan and the EU, I examined the relative export to home prices of three steel products over the 1961–1976 period: bars, cold rolled sheet and plates. I employed a generalized likelihood ratio test and found that, at conventional significance levels of 0.1 or below, none of the three regions cyclically dump for any of the three products. At a weak unconventional significance level of 0.25, we would accept the hypothesis of cyclical dumping for EU bars and plate and U.S. bars, but not for any of the Japanese products.

Part 5: Mathematical Economic Models

During the first several years of my career, I worked on mathematical economic models, first on dynamic oligopoly, especially under uncertainty, and then into more diverse areas of mathematical models. As my interest shifted to more applied aspects of international trade policy, I embraced computable general equilibrium modeling as a merger of my interest in mathematical economics and applied policy. The papers reprinted in this volume and that background greatly facilitated my work in applied general equilibrium modeling.

Chapter 27: Distributed Lags, Morishima Matrices, and the Stability of Economic Models, David G. Tarr, *Econometrica*, 1976

In this paper, I examine the question of when can the introduction of a distributed lag in a discrete time dynamic model stabilize or destabilize a discrete time dynamic model with the simplest lag structure. It had been shown by Bear (1966) that when all matrices in the dynamic part of the system are nonnegative that stability of a model with the simplest discrete time lag structure is equivalent to stability of the model with distributed lags, provided the “potential” of the system is preserved with both lag structures. But if there are negative elements present, the form of the lag structure can impact stability. In this paper, I extend the conditions under which the lag structure does not impact stability. I show that if negative elements exist, but the “potential” is preserved as in Bear’s model, stability of the simplest lag structure is equivalent to stability of a distributed lag structure provided the matrices satisfy the Morishima matrix pattern.

Chapter 28: Expectations and Stability with Gross Complements, David G. Tarr, *Review of Economic Studies*, 1978

In analyzing the stability of a competitive economy in a continuous time general equilibrium model, Arrow and Nerlove (1958) showed that if all goods in the economy (both present and future) are gross substitutes, stability with “static” expectations is equivalent to stability with adaptive expectations. In this paper, I extended the Arrow-Nerlove result by showing that we may allow gross complements in the system and have stability with adaptive expectations if and only if we have stability with static expectations, provided that complement-substitute relationship of goods both present and future satisfies the Morishima matrix pattern. The Morishima matrix pattern means that we assume that substitutes of substitutes are substitutes, complements of complements are substitutes and substitutes of complements are complements. I also show that introducing adaptive expectations can impact stability when there are gross complements in the system.

Chapter 29: A Permanent Income Approach to the Growth of Income by Sectors in a Leontief Economy, David G. Tarr, *Quarterly Journal of Economics*, 1975

Nikaido (1964; 1968) developed a multi-sector growth model where technology of intermediate use is characterized by a Leontief input-output matrix, and where consumption decisions were based solely on the sector's income from the previous period. Based on his permanent income theory of consumption, Friedman (1957) has argued persuasively that consumption decisions would be based on an arbitrary number of past periods rather than the current period alone. In this paper, I extend the Nikaido model to allow for consumption decisions to be based on m previous periods, where m is arbitrary, i.e., the model includes lags of m periods. I first derive a necessary and sufficient condition for the existence of a balanced growth path and its relative stability. Without knowledge of the growth rate of demand, I show that the introduction of lags can make a stable system unstable or an unstable system stable. If exogenous demand is non-increasing for all sectors, I show that existence of a balanced growth path and its relative stability for the lagged system is sufficient for the same for the first order system. If exogenous demand is non-decreasing for all sectors, I show that existence of a balanced growth path and its relative stability for the first order system is sufficient for the same for the lagged system.

Chapter 30: Stability in a Cournot Market Characterized by Uncertainty, David G. Tarr, *Western Economic Journal (Economic Inquiry)*, 1972

This paper was based on my PhD dissertation at Brown University in which I examined the stability of oligopolistic markets under uncertainty. Models of oligopolistic markets (either static or dynamic) traditionally had to make a

behavioral assumption about how oligopolists react to output or price changes of their competitors. In the decade prior to this paper, several papers had been published on the subject of the stability of markets characterized by oligopolistic interaction. These papers had employed one of the traditional assumptions in the theory of oligopoly regarding oligopolistic expectations of reactions, such as the Cournot (Theocharis, 1960; Fisher, 1961), conjectural variations (Sato and Nagatani, 1967), or adaptive expectations (Okuguchi, 1970). In these studies, the firm is assumed to act as though it knows its competitors' output reactions with certainty, or that any level of output reaction other than the one implied by the behavioristic assumption occurs with assessed probability zero. Given that we don't really know how oligopolists react to each other with generality, there was widespread dissatisfaction with this assumption. Moreover, results that are discovered about oligopolistic markets with one behavioral assumption do not necessarily generalize due to the loss of generality of the behavioral assumption.

The key generalization of this paper was to develop a model that allows for uncertainty about the reactions. I assume that the firm views the outputs of its competitors as a random variable to which it assigns a subjective probability function. I assume firms use all available information in forming expectations, so the outputs of all of the firm's competitors for m previous periods are parameters of the probability distribution. Most of the traditional assumptions in the literature become special cases of this probability function and therefore, results obtained with this model generalize to all such models.

In a model with constant marginal costs and Cournot expectations, Theocharis found the market to be unstable for more than two firms. Frank Fisher showed that with increasing marginal costs in the Cournot model, the market is more likely to be locally stable, the faster the marginal costs of the firm increase and marginal costs can be found to increase fast enough to guarantee stability for any number of firms. In the case of fully general demand and cost functions, I show that the result of Fisher generalizes to the more general probability function. Further, I found that the market is more likely to be stable the more invariant is the probability distribution with respect to a change in the parameters of the distribution when evaluated at equilibrium. An additional result can be obtained with the assumption of a linear demand curve and quadratic cost curve as assumed by Fisher, and some reasonable limitations on how the mean of the probability distribution changes. I show that the mean of the firm's probability density function may always change slowly enough to guarantee stability in the Fisher model with any number of firms, even when marginal costs are increasing slowly. This latter result is dependent on the assumption of a linear demand function and quadratic cost function.

Chapter 31: On the Stability of Oligopoly with Nondogmatic Conjectures, David G. Tarr, *Metroeconomica*, 1975

In this paper, I focus on the class of probability distributions that allows conjectural variations to be a special case. In addition to the condition of increasing marginal

costs and the number of firms as discussed in the previous paper, I show that, in the linear demand and quadratic cost function case, the market is more likely to be stable: (i) the more elastic the demand curve; (ii) the less each oligopolist changes the mean of its probability distribution when any of its rival firm's output changes in any prior period; and (iii) the less oligopolists believe they can invade their competitors' markets. The latter result generalizes the Sato and Nagatani (1967) result in their model of conjectural variations to a general probability distribution.

Chapter 32: The Effects of Adaptive Expectations on the Stability of Price-Adjusting Oligopoly, David G. Tarr, *Southern Economic Journal*, 1975

The Cournot (Bertrand) assumption in models of oligopoly means that firms assume that the output (price) of their rivals does not change when their own output (price) changes. (In this paper, I followed the literature and called this assumption Cournot, whether conjectures were on quantity or price.) Economists often express a preference for the adaptive expectations assumption in models of oligopoly, since adaptive expectations allow for "learning" about how their rivals respond. In this paper, I investigate whether adaptive expectations impacts the stability of oligopolistic markets relative to the Cournot assumption.

Richard Quandt (1967) established sufficient conditions for the stability of Cournot conjectures in a price-adjusting model of oligopoly with product differentiation and a linear demand curve and quadratic cost curve. Koji Okuguchi (1968) showed that in the Quandt model, the Quandt conditions were also sufficient for stability with adaptive expectations. It was unknown, however, whether stability of Cournot oligopoly was either necessary or sufficient for stability of the model with adaptive expectations. In this paper, I show that in the Quandt model (price-adjusting model of oligopoly with product differentiation and a linear demand curve and quadratic cost curve), stability of the model with Cournot expectations is both necessary and sufficient for stability of the model with adaptive expectations. Moreover, I show that the Quandt sufficiency conditions for stability (regarding marginal costs, number of firms and sensitivity of sales to a change in the firm's own price or rival's price) are both necessary and sufficient for stability.

Chapter 33: A Note on the Dominant Diagonal Matrix and Its Extensions, David G. Tarr, *The Economic Studies Quarterly (The Japanese Economic Review)*, 1977

The concept of a dominant diagonal matrix is often very important in the analysis of the stability of economic models. Several authors had proposed various extensions to the original dominant diagonal concept. However, the relationship of any of these extended versions of the dominant diagonal matrix to the original definition of the dominant diagonal was unknown. In this paper, I show that all these ostensibly

extended versions of the dominant diagonal are equivalent to the dominant diagonal matrix. The theorem has practical importance in that sometimes it may be easier to show that a matrix satisfies one of the extended versions of the dominant diagonal. Then, by the theorem in this paper, we know it has a dominant diagonal and may use the better known properties of dominant diagonal matrices. This property was useful in establishing the stability of the models in Tarr (1972; 1975a).

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