Trade Policy and the Macroeconomy[1]
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It's an honor and privilege to have been asked to deliver the Mundell-Fleming Lecture. It's also a bit intimidating. I won't read off the entire list of luminaries who have given this lecture. But they include our master of ceremonies and my Berkeley colleague Maury Obstfeld. They include Stanley Fischer, my boss when I worked at the IMF. And they include my oldest and closest childhood friend from the age of three. (If you don't know who that is, you get to guess.)

My topic today is trade policy and the macroeconomy. I chose this as my topic for several reasons.

The first is, of course, Donald Trump. President Trump has controversially argued that tariffs are good for economic growth. This makes now an important time to reconsider the question.

A second reason is: Paul Ryan, or more precisely the idea of a border-adjustment tax, advocated by Representative Ryan and a number of his Congressional colleagues. A border-adjusted, destination-based cash-flow tax is, under certain conditions, the same as an import tariff coupled with an export subsidy. It therefore raises a number of similar analytical issues, specifically in a world of floating exchange rates. The BAT may be off the table in the U.S. at the moment, this doesn't mean that it won't be back.[2]

Third, the framework most widely used to analyze these issues is, appropriately for this venue, the Mundell-Fleming model. Mundell himself referred to trade policy on the first page of his canonical *Canadian Journal* article in 1961. In the benchmark Mundell-Fleming model, as he showed there, the existence of output effects from the imposition of a tariff hinges on the Laursen-Metzler effect (the tendency for an improvement in the terms of trade to affect saving positively).[3] In the presence of the Laursen-Metzler effect, a tariff improves the current account by raising saving relative to investment, much in the manner that advocates like Mr. Trump suppose. By reducing spending, it also lowers output, however, which is presumably not the corollary effect they anticipate.

In the absence of the Laursen-Metzler effect, on the other hand, the impact of trade restrictions on output is exactly offset by currency appreciation, a neat neutrality result if there ever was one. This is how this material is taught in intermediate macroeconomics textbooks down to the present day.[4] It may useful, therefore, to go back and consider the extent to which

[2] Specifically, it may be back due to its revenue-raising potential for a country currently running a current account deficit and needing to reconcile cuts in tax rates with revenue neutrality.
[3] One might say "the elusive Lauren-Meltzer effect," because Obstfeld (1982) showed that theoretical support for the existence of a Laursen-Metzler Effect is fragile (in essence, that whether saving rises with an improvement in the terms of trade depends on why the terms of trade improve). In addition, the empirical literature is split, with both Chinn and Prasad (2003) and Agenor and Aizenman (2004) rejecting the hypothesis of such an effect.
[4] Refer, for example, to Mankiw (2014). It is also invoked in discussions of trade negotiations – for example, in the observation that anticipations earlier this year that President Trump would abandon NAFTA were accompanied by

this result survives developments in open-economy macroeconomics in the intervening half century.

Fourth, the literature on this subject is importantly informed by research here at the IMF. Mundell's *Canadian Journal* article, to which I just referred, appeared during the author's two-year stint at this institution though it was written before he got here.[5] The IMF has continued to produce important research on this issue, including recently.[6] It has also weighed in on the policy implications. Among those who have spoken about trade policy and the macroeconomy in the last 12 months are the Managing Director and the chief economist and economic counsellor.[7] It is further striking that while the IMF has adopted a "new view" of restrictions on international capital flows that allows for more nuance – that allows for more restrictions, to put it more bluntly – it has not adopted a new view of restrictions on current account transactions. It behooves us to reflect on the contrast.

Fifth, these are issues on which historical evidence has been used to shed light. This topic thus permits me to consider that historical evidence, which plays to my comparative advantage (appropriately, one might say, for a lecture on the topic of trade).

Sixth and finally (perhaps I should say "sixth and self-indulgently"), this is where I came in. My Ph.D. dissertation was on the macroeconomic effects of trade restrictions, and my first published article in (gulp) 1981 was a model of the output and employment effects of tariffs under flexible exchange rates. This means, among other things, that I can recall some older literature that may not be familiar to younger members of this audience. How many of you, he asks, remember the models of tariffs, output and the current account of Krugman (1982) and Dornbusch (1987)? These were smart guys. It will not surprise you, therefore, to learn that I regard much recent research on these topics, while admirable for its rigor and elegance, as rediscovering the wheel.[8]

My remarks are in three parts. First, I will consider the evidence on tariffs and growth from an historical vantage point. Next I will review what we know about trade policy and macroeconomic fluctuations. Although the first part is about growth and the second part is about fluctuations, similar issues arise in the two contexts. In concluding, I will then return to the current policy debate.

I will argue that both theory and empirics in this area have ambiguous implications. Even more than other areas of economics perhaps, conclusions are sensitive to assumptions. Theoretical results are fragile, and empirical findings are context specific. Given this uncertainty, I will argue that the best guideline for practitioners tempted to deploy trade policy for macroeconomic purposes remains Hippocrates' dictum, "first, do no harm."

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immediate depreciation of the Mexican peso against the dollar, which promised to offset any impact of a more restrictive trade policy toward Mexico on the U.S. economy (see for example the discussion in Freund 2017).
[5] As Mundell describes in his own keynote address to the very first IMF Annual Research Conference (Mundell 2001).
[6] Citations are below.
[7] See Lagarde (2017) and Obstfeld (2016).
[8] There are other contributions from this era; I would be remiss not to mention Tower (1973), Boyer (1977), Chan (1978) and Nielsen (1989).

1. Trade Policy and Growth

Nothing one can say in this area is uncontroversial, but probably the least controversial statement I will make is that there exists a broad consensus that trade openness is positively associated with growth. I am aware, of course, of the widely-cited article by Rodriguez and Rodrik (2001) casting doubt on cross-country studies purporting to establish this fact. The authors highlight the difficulty of adequately measuring trade restrictions when nontariff barriers (NTBs) are pervasive. They observe that trade barriers and other policies are correlated. They point to the problematic nature of unconditional statements.

Notwithstanding this critique, the consensus, I would argue, continues to hold. If not cross-country regressions, then an accumulation of qualitative evidence and detailed case studies convincingly support it.[9] I am thinking of Anne Krueger's classic analyses of Korea, Taiwan, Columbia and Turkey (Krueger 1983, 1984), and of related work by Jagdish Bhagwati (1978) and by Ian Little and his coauthors (Little et al. 1970).[10] There is the contrast between East Asia and Latin America (Sachs 1985). There is the post-1990 experience of China. More recently we have analyses of firm-level data (Pavcnik 2002, Amiti and Konings 2007), which don't capture general-equilibrium effects but are not subject to the measurement and endogeneity problems of cross-country regressions.

Thus, it is perplexing that nothing resembling the same consensus exists regarding the first age of globalization, prior to 1913. Neither cross-country regressions nor country case studies clearly support the presumption that trade openness was good for growth. This is all the more striking for the fact that most trade restrictions in this earlier period were tariffs rather than NTBs, making measurement more reliable. It is striking for the fact that a number of economies had their trade policies determined by foreign powers, obviating obvious endogeneity concerns (think India but also China and Japan).

It may have been the Swiss historian Paul Bairoch, in a 1972 survey of European development, who first observed that tariffs and growth were positively correlated in the 19th century (Bairoch 1972).[11] O'Rourke (2000) then estimated unconditional convergence equations, conditional convergence equations, and factor-accumulation models for a panel of ten countries and eight periods between 1874 and 1914, and concluded from all three approaches that tariffs were positively associated with growth.[12] The result is robust to including country fixed effects; it is not simply about the fast growth of high-tariff America or the slow growth of free-trade Britain. It is robust to controlling for initial income; it is not all about high tariffs in catch-up economies. It is robust to including changes in capital/labor and land/labor ratios; it is not all about a correlation between tariffs and the presence of a frontier. It is robust to expanding

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[9] Other work has sought to defend the compatibility of cross-country regressions with the conventional wisdom, arguing that the effects of openness vary with circumstances but are generally positive. See Wacziarg and Welch (2008), Billmeier and Nannicini (2013) and Estevadeordal and Taylor (2013) for research along these lines.

[10] Asking whether higher import duties in the U.S. are "a good idea" is not exactly the same as asking whether they would stimulate faster growth, but when the University of Chicago's IGM Forum polled some three dozen economists on this in late 2016, 100% of respondents answered no. http://www.igmchicago.org/surveys/import-duties.

[11] The author developed the point further in Bairoch (1989)) and Bairoch (1993).

[12] Vamvakidis (1997) finds the same positive correlation for the 1930s.

the country sample and dropping labor-scarce, land-abundant countries like the U.S. and Argentina with high growth potential and also limited tax handles (Jacks 2006). One can tell stories about special factors other than tariffs making for high growth in each successful country. For the U.S. this would be iron ore and petroleum (Wright 1990). For Argentina it would be wheat and beef (della Paolera and Taylor 2011). Even putting these special cases aside, the tariff-growth paradox remains intact.[13]

The problem is that none of the standard explanations for this positive tariff-growth correlation hold water. Generalizing from their reading of U.S. history, Collins and Williamson (2001) argue that imports of consumer goods were taxed more heavily in this period than imports of capital goods. Tariffs therefore lowered the relative price of capital and through this channel boosted investment and growth. This result is consistent with the focus in Abramovitz and David (1973) on the sharp rise in the capital/output ratio in the United States in the second half of the 19th century. It resonates with the work of DeLong and Summers (1991), who emphasized the importance of equipment investment for growth in the 20th century.

Unfortunately, this interpretation does not withstand scrutiny. To start with, the relative price of investment goods depended on other things besides just tariffs, things like resource endowments and the direction of technical change. While Collins and Williamson show that the simple correlation between average tariffs and the relative price of capital goods was negative in their international sample, that negative correlation does not survive the addition of country fixed effects capturing these other things (O'Rourke 2000). A detailed analysis of the U.S. tariff code by DeLong (the same DeLong of DeLong and Summers fame) does not support the idea that the tariff favored imported investment goods over consumer goods. To the contrary, DeLong verifies the existence of tariffs on imports of capital goods as high as 50 per cent, and concludes that "the tariff made a wide range of investment goods – from British machine tools and steam engines to steel rails to precision instruments – more expensive" (DeLong 1998, p.369). Household budgets were disproportionately devoted to food and housing – food and housing services being what we mean when we refer to consumer goods in the 19th century – and these were not the items subject to import tariffs; to the contrary, tariffs mainly targeted imported manufactures.[14] If the U.S. and certain other countries grew fast in this period because the relative price of investment goods was low, then that low relative price must have reflected factors other than the tariff.[15]

Another possible explanation is the infant-industry argument, specifically the version which assumes that learning by doing is concentrated in the industrial sector. No doubt there was learning in the 19th century. But was it disproportionately concentrated in industry? Was it promoted by trade policy? And what prevented it from happening in the absence of tariffs?

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[13] The regression evidence survives dropping these two countries from the sample, in other words. Not everyone reads the evidence as I do. Irwin (2002) argues that the positive correlation in the O'Rourke sample hinges on the inclusion of key outliers. He adds countries and shows that this weakens the growth-tariff correlation. He does not control for inter alia changes in factor inputs, however, data on such ancillary variables not being readily available for additional countries. Tena-Junguito (2009) similarly considers a larger country sample and reaches Irwin-like conclusions but is similarly unable to directly control for other country characteristics.

[14] There were exceptions, like the German "marriage of iron and rye," which resulted in both agricultural and industrial imports being taxed, but even there tariffs on agricultural imports were cut starting in the 1890s.

[15] Those additional factors plausibly included transport costs and other frictions segmenting national markets, differences in technological sophistication, and different endowments of skilled labor and materials.

Certainly, the historical literature is consistent with the idea that temporary protection can have long-lived, even permanent, effects in shifting comparative advantage. Juhasz (2014) shows that French cities that enjoyed temporary protection from British textile exports during the Napoleonic Wars were quick to enter the cotton spinning industry and remained internationally competitive long after trade with Britain was restored.[16] Hanlon (2017) shows that Great Lakes-based producers who enjoyed natural protection from British exports of steel ships completed the transition from the production of wood- to steel-hulled vessels more successfully than their Atlantic Seaboard counterparts, who were rapidly competed out of business.

Other examples of this natural-experiment-type evidence could be cited. But none of these studies really documents the existence of localized learning – of intra-firm knowledge spillovers from production. Where scholars, for example Doug Irwin (1998) in the case of tinplate production, looked for them, they found that knowledge spillovers are as much international as domestic; Irwin finds that U.S. tinplate producers learned from the previous experience of Welsh producers (not a few of whose workers migrated to the U.S.) as much if not more than from their neighbors. If the rationale for the positive tariff-growth correlation in this period is localized learning external to the firm, then the evidentiary jury is still out.

The other way of motivating the infant-industry argument is to posit that learning by doing was internal to the firm but that capital-market constraints prevented inexperienced firms from borrowing to finance losses now in order to learn and enjoy higher productivity and profits later. Borrowing constraints, recall, are a standard argument for protecting infant industries on second-best grounds (Dasgupta and Stiglitz 1988). But this emphasis on capital market constraints sits uneasily with the extent of international borrowing and lending in this earlier period. Capital controls were essentially non-existent in the 19th century, and a significant share of investment was financed by foreign borrowing (a much higher share than the IMF would regard as prudent today).

Here the mystery deepens: whereas modern studies do not support the hypothesis of a positive correlation between capital-account openness and growth (or between foreign borrowing and growth), the 19th century data are overwhelmingly consistent with a positive correlation. In this earlier period, countries more deeply integrated into global capital markets clearly grew faster. Schularick and Steger (2010) analyze the relationship between the growth of real GDP per capita and financial integration in the decades before 1913, controlling for initial income, other policies and endogeneity, and measuring financial integration in a variety of different ways. Financial integration, they find, was positively, significantly and robustly associated with economic growth. Thus, precisely the same empirical set-up used in analyses of the modern period leads to the opposite conclusion regarding openness to merchandise trade (negative for growth then, positive now), and also to the opposite conclusion regarding openness to capital flows (positive for growth then, negative or at best nonexistent now).

Fully analyzing this difference in the association between financial integration and growth would take me too far afield. One story is that foreign finance was disproportionately devoted to fixed investment in this period when there was a high social rate of return to fixed investment, both in infrastructure and other projects.[17] Capital flows were long-term,

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[16] The French blockade on imports from Britain was not as effectively enforced in Southern Europe as in Northern Europe, and it is this geographical variation that Jurasz exploits.
[17] They were devoted to what Feis (1930) and Fishlow (1985) refer to as "development finance."

appropriately for such investment projects and consistent with the modern IMF presumption that long-term capital flows are better.[18] To be sure, it was mainly large enterprises, like railways, that borrowed abroad. But this meant that domestic finance that otherwise would have been absorbed by the railways became available to other borrowers for other uses. And there are now multiple studies showing that domestic financial markets became increasing well integrated as the period progressed (see e.g. Davis 1965, James 1976, Davis and Gallman 2001).

Nor is it plausible that strategic trade policy makers had more autonomy to target industries where the scope for learning was greatest. There is no evidence that the problem of capture was less serious than today. One only needs to read the debates over the McKinley Tariff (Conybeare 1991) or the German "marriage of iron and rye" (Pahre 2007, Schonhardt-Bailey 2014) to be reminded that trade-policy making was highly politicized and logrolling was pervasive.

By process of elimination, we are left with the simplest hypothesis: that tariffs, which in this earlier period typically protected manufacturing more generously than agriculture, were associated with higher incomes and faster growth because the productivity of labor, and perhaps also the productivity of other factors of production, was significantly higher in manufacturing than agriculture.[19] The 19th century was a period of unprecedented technological progress, in industry in particular. (It wasn't called the Industrial Revolution for nothing.) As a result, disequilibrium wage and productivity gaps between workers in agriculture and industry were substantial in the period's late-developing countries. We can take Great Britain as the equilibrium benchmark, where industrialization began early and a substantial movement of workers out of agriculture into industry had occurred already by 1850, such that the productivity of labor in agriculture and industry was roughly equalized (this being what the data, in fact, suggest).[20]

But this was not yet the case in other countries where industrialization began later and the growth of manufacturing now proceeded faster, catch-up style. Broadberry and Irwin (2006) confirm that labor productivity in agriculture was almost exactly equal in the U.S. and UK, and that the two series rose in tandem in the second half of the 19th century. But labor productivity in U.S. industry was 50 to 80 per cent higher throughout the period, suggesting a persistent disequilibrium in the sectoral distribution of labor, and scope for faster growth through policies encouraging further expansion of the high productivity sector.[21] This persistent disequilibrium

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[18] I would note, however, that foreign investment in this earlier period was not mainly foreign direct investment; it was mainly portfolio investment (bond finance), so it does not necessarily support the view that foreign finance works best when it is in the form of FDI. Such portfolio investment as occurred could dry up abruptly; there was no dearth of sudden stops and debt crises (Reinhart and Rogoff 2009). If countries that were more dependent on and integrated into global financial markets grew faster, they did so despite their vulnerability to crisis risk.

[19] Countries like Germany, which protected both industry and agriculture, as noted above, were an exception to this generalization about tariffs falling most heavily on manufactured goods. Temin (2002) argues that German growth suffered in this period from the Empire's maintenance of protection for agriculture, which slowed the shift of resources into industry; to the extent that growth was rapid, it follows that this must have been for other reasons.

[20] Trade policy played a role here as well. Abolition of the Corn Laws (tariffs on agricultural imports) in the 1840s removed protection from a previously favored sector, leading to additional transfer of labor out of agriculture, as producers concentrated on more fertile land, high-value-added crops and more capital-intensive methods. Clark (2002) describes the sources of agricultural productivity growth in this period.

[21] The wage gap between agriculture and manufacturing in the U.S. was even larger, on the order of five-fold for much of the 19th century. But one should be careful. As research at the IMF (Mourmouras and Rangazas 2005) has

could have translated into a significantly higher rate of growth in countries like the U.S. that promoted this process of sectoral reallocation with protection for industry. Consistent with this view, Lehmann and O'Rourke (2011) find that tariffs on imports of manufactures were positively associated with the growth of per capita GDP in a cross-section of countries, but that tariffs on imports of agricultural goods were not.[22]

The obvious challenge to this interpretation is that productivity gaps between agriculture and manufacturing are even larger in developing countries today. Using data from the Penn World Tables and the Food and Agriculture Organization of the United Nations, Restuccia, Yang and Zhu (2008) estimate that non-agricultural workers are 7 times as productive as agricultural workers in poor countries today. That same measured productivity gap is on the order of 5 to 1 in middle-income countries. It is considerably smaller, on the order of 1.3 to 1, in advanced countries like the United States (Herrendorf and Schoellman 2011), where it can be dismissed as reflecting compensating differentials and other nonpecuniary factors. Reference to these nonpecuniary factors is a reminder that we should be careful about taking these figures at face value.[23] Still, if one attributes the positive tariff-growth correlation in the 19th century to protection for manufacturing in an environment where there existed a large productivity gap between manufacturing and agriculture, then one must confront the question of why tariffs on imported manufactures when imposed by developing countries today don't have the same effect.

The explanation, I submit, is that the reasons for the productivity gap were different. In the 19th century, its source was a succession of positive shocks to manufacturing productivity, in conjunction with information and migration costs that prevented labor from being reallocated at a rate sufficient to close the gap.[24] Nowadays, every farmer in Western China knows how much higher wages are in manufacturing enterprises on the coast, and only the internal passport (*hukou*) system prevents more of them from moving in response.[25] Channels for disseminating this information, while not absent in the 19th century, were less well developed. There may have been want ads, labor recruiters and letters from relatives, but there were no smartphones, text messaging or internet. And in some cases, like the U.S. South, labor recruiters were made to feel unwelcome by planters and others who valued their captive labor force, preventing those labor-market intermediaries from doing their work.[26]

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shown, half of this gap reflects non-wage compensation of farm workers and cost of living differences between urban and rural areas. A portion of the rest reflects that workers in manufacturing worked longer hours. Another portion is due to the measurement problem that some portion of agricultural output is not marketed and therefore unmeasured. Removing these factors yields an estimated labor productivity gap similar to that cited in the text.

[22] Nor is there a positive correlation with tariffs on "exotics" (wine, tea, sugar and other luxury goods, imports of which were taxed exclusively for revenue-raising reasons). Tariffs on agricultural imports, in this sample, are in fact negatively associated with the growth of per capita GDP.

[23] In other words, they may reflect, at least in part, the existence of non-marketed, nonmeasured output in agriculture, differences in hours worked across sectors, and other factors, as noted in footnote 21.

[24] Describing those positive shocks would require another lecture. A good introduction is the article by Wright (1990) cited earlier.

[25] The argument regarding the 19th century must rest mainly on costs of information rather than simple transportation costs, given that the latter could be recouped in a matter of weeks (Rosenbloom 1990).

[26] The special case of the South is the topic of Wright (1994).

This, in conjunction with positive shocks to technology in manufacturing, kept labor productivity in the two sectors in a state of persistent disequilibrium.[27] Hence tariffs protecting manufacturing, with the intent of making the sector larger, offset domestic distortions making the sector too small.[28] First best, of course, would have been policy attacking those distortions directly. More U.S. states could have followed New York in establishing public labor bureaus to provide information on alternative employment opportunities. The federal government could have attacked social and other policies preventing integration of the South with the national labor market and slowing the movement of labor from Southern agriculture to Northern industry. Other countries could have taken analogous steps. But in the absence of these first-best interventions, which were resisted on grounds of ideology, self-interest and because in some cases government lacked the relevant capacity, tariffs were second best.

The problem in poor countries today is different. It is the existence of domestic distortions that depress agricultural productivity and at the same time make it hard for manufacturing to expand, tariff protection or not. In the 19th century, recall, absolute levels of labor productivity in agriculture were the same in early and late developers; they were the same in Britain and the United States. Today, in contrast, absolute level of labor productivity in agriculture are an order of magnitude lower in late-developing countries. In poor countries today, labor productivity in agriculture is depressed by lack of access to the chemical fertilizers, pesticides, energy, and machine services produced by the industrial sector.[29] Tariff protection for industry does nothing to offset these distortions and may only reinforce them by raising the cost of industrial inputs. The inability of manufacturing to expand productively may reflect the absence of labor with the requisite skills, inadequate infrastructure, or an unstable and unpredictable policy environment. Again, these are distortions to which tariff protection is at best irrelevant.[30]

This resolution of the paradox is consistent with the observation that the tariff-growth correlation was positive then, but negative or zero today. It is also a caution to President Trump and other advocates of protection for manufacturing in high-income countries. The domestic distortions that made tariff protection productive second-best policy in 19th century America are no longer the relevant distortions today. The domestic distortions that matter today, the opioid problem cited by U.S. employers as a binding constraint on their expansion for example, cannot be offset by tariff protection.[31]

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[27] Rosenbloom (2002) provides an introduction to the relevant 19th century labor market arrangements for the U.S., while Rosenbloom (1990) provides evidence for this persistent-disequilibrium characterization of 19th century labor markets.

[28] The effects of tariff protection would still vary, of course, with the severity of the distortion, which might differ across countries. Unfortunately, there are few systematic cross-country comparisons of labor mobility in this period. For discussion see Long and Ferrie (2005).

[29] These are all industrial inputs into agriculture, which were less important in the 19th century.

[30] Completeness requires mentioning a final hypothesis, that tariffs were helpful on big-push grounds in the 19th century, when they encouraged countries to invest in a set of complementary industries in each of which productivity depended on investment in the other sectors, but that they were no longer helpful in the 20th century, when countries could plug into global supply chains, limiting the importance of domestic complementarities. The problem, to my mind, is that the observed change in the tariff-growth relationship long predates the significant development of global supply chains at the end of the century.

[31] See Schwartz (2017) on this constraint.

2. Trade Policy and Fluctuations

One popular explanation for the high 19th century capital mobility noted earlier is, of course, the classical gold standard. The gold standard sent positive signals about the quality of policies in the country adopting it, and it limited noise in foreign exchange and financial markets (Bordo and Rockoff 1996). By discouraging governments committed to its maintenance from running excessive deficits (Flandreau, Le Cacheux and Zumer 1998), it allowed foreign funds to flow into infrastructure projects and other private investments.

But the gold standard is also a possible reason why the effects of tariffs were different in this earlier period, in that their impact was not offset by changes in the exchange rate. This brings me to the second part of my talk, on the implications of trade policy for macroeconomic fluctuations.

The first fully-articulated statement of the case for a tariff as macroeconomic policy of which I am aware was Keynes in 1930.[32] Keynes had in mind, well, a Keynesian model in which prices are sticky in domestic-currency terms and the economy is operating below full employment. He had in mind an environment in which monetary and fiscal policies are constrained, or at least their effectiveness is limited, by a fixed exchange rate. He had in mind the British economy in the early stages of the Great Depression, in other words. Keynes described how a tariff, by raising import prices and shifting demand toward domestic substitutes, would stimulate output and employment.[33]

It then fell to Mundell, three decades later, to consider the flexible-exchange-rate case and show, under plausible assumptions (stability of equilibrium and no Laursen-Metzler effect), that the exchange rate would appreciate to offset the tariff, leaving the relative price of domestic- and foreign-produced goods and, with it, output and employment unchanged. All that would be left were tariff-related distortions and inefficiencies, of which even Keynes, writing in 1930, described himself as "frightfully afraid."[34]

This neutrality result is the same as the argument of those who suggest that the first-order relative price effects of the United States imposing a border-adjustment tax (BAT) will be zero. They suggest that the relative price effect of a 20 per cent tax on corporate revenues deriving from imports in conjunction with an exemption for exports would be exactly offset by a 20 per cent depreciation of foreign currencies against the dollar.[35] Assuming no first-order effect on saving or investment, there will be no change in the current account. It follows that there can be

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[32] This was in Keynes' private evidence to the Macmillan Committee (reprinted in Moggridge 1980).

[33] Equivalently, he described how a tariff, by raising profitability for domestic producers, would encourage investment, boosting output and employment in his proto-Keynesian model. In this emphasis Keynes was adopting the framework he developed in his *Treatise on Money* (Keynes 1930), although in the *Treatise* he did not consider the case for a tariff directly.

[34] Moggridge (1980), p.120.

[35] See Auerbach (2017a). Where Mundell considered only an import tariff, he was working with a one-good model. With two goods, importables and exportables that are imperfect substitutes, we need the combination of an import tax and export rebate or subsidy in order for offsetting exchange rate changes to leave relative prices unchanged. Baumann, Dieppe and Dizioli (2017) emphasize the importance of the rebate for exporters for this neutrality result. Note that the assumption of zero first-order effects is not to deny the existence of second-order effects due to the move a less distortionary tax system, to which I return momentarily.

no change in relative prices, and adjustment of the exchange rate must make it so. Firms that rely on large amounts of imported content that otherwise would be damaged by the imposition of this tax on imports, Walmart and Target for example, can rest easy.

This is similarly the implication of the literature taking an intertemporal approach to the current account (e.g. Razin and Svensson 1983, Aschauer 1987). A permanent border-adjustment tax, like a permanent tariff, will have no impact on the current account because it has no implications for intertemporal relative prices; its permanent impact on import prices must be exactly offset by commensurate appreciation of the exchange rate (or, in a world of wage and price flexibility, by commensurate adjustments in domestic-currency prices).[36]

But there are a number of reasons why this neutrality result may fail.[37] For example, if there is an extended debate over the desirability of tax reform, as seems inevitable in a democracy, then the exchange rate may move before adoption of the import tax.[38] The result I the short run will be a loss of competitiveness for domestic producers of traded goods and lower levels of output and employment.[39] This, I can't resist observing, was exactly the conclusion of the first generation of studies, post Mundell, that considered the macroeconomic effects of tariffs in models with forward-looking agents, namely that if imposition of the tariff was anticipated the exchange rate would appreciate in advance (Eichengreen 1981, Krugman 1982).

This neutrality result also assumes that the dollar price of imports moves with the exchange rate. It assumes, as did the early literature, that prices are sticky in the producer's currency.[40] But in a world of dollar invoicing, the domestic price of imports will not move with the exchange rate (Gopinath, Itskhoki and Rigobon 2010, Gopinath 2017).[41] If it doesn't, then the tax will shift spending from foreign- to locally-produced goods. It will do so both in the U.S., where the tax raises the price of imports, and abroad, where currency appreciation has the analogous effect.

This simple logic also omits the capital account and the foreign asset position. Mundell (1961) had just internal balance and external balance schedules. There was no LM curve, no

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[36] While a temporary tariff or border-adjustment tax is different, that's not what's under discussion in the tax-reform debate. Razin and Svensson (1983) analyze the temporary-tariff case in a simple intertemporal model, showing that it will result in less short-run appreciation of the exchange rate than in the permanent-tariff case and therefore some short-run improvement in the current account. Erceg, Prestipino and Raffo (2017) analyze the equivalent policy in a dynamic New Keynesian open economy with optimizing consumers and producers, where producer prices are sticky as in Calvo (1983) and there is full passthrough of exchange rate and tax changes, together with a central bank following a Taylor Rule. They show that the Razin-Svensson results carry over, and in addition there will be positive short-run output effects. I note for amusement that these are exactly the effects of a temporary tariff in earlier, less elaborate models with forward-looking behavior such as Eichengreen (1981). There is empirical support for these theoretical propositions: Li (2004) found that exchange rate movements were smaller in episodes of trade liberalization where policy reversals were expected.

[37] See for example Barbiero, Farhi, Gopinath and Itskhoki (2017) and Lindé and Pescatori (2017).

[38] Auerbach (2017b) provides further discussion of this scenario, including the possibility that the tax is phased in over time.

[39] This assumes other sources of price stickiness or else asset-valuation effects of the sort described below. Appreciation of the dollar in the final two months of 2016, plausibly reflecting expectations that the newly elected U.S. president would impose new tariffs on imports, was consistent with this interpretation.

[40] It assumes, in the U.S. case, that U.S. imports have sticky foreign-currency prices, so they move one-to-one with the exchange rate (passthrough is 100 per cent), while the prices of their domestic substitutes are sticky in dollars.

[41] Here, obviously, I am discussing the case of the U.S.; the more general case is that of domestic-currency invoicing or pricing to market.

Taylor Rule, and no portfolio-balance relationship. How does the story change with their addition?[42] Since the BAT switches spending toward domestic goods, which are in less than perfectly elastic supply, the exchange rate has to adjust to shift some of that spending back toward foreign sources, as before. But now this local currency appreciation also reduces the value, in terms of U.S. goods, of residents' foreign-currency-denominated assets. So there will now be expenditure changing as well as expenditure switching. Finding themselves to be less wealthy, residents will spend less. Saving will rise relative to investment, other things equal, and the current account will strengthen.[43] But for the current account to strengthen, the (real) exchange rate will now have to rise by less than 20 per cent.[44] Whether output and employment rise or fall in the short run will depend on whether expenditure changing or expenditure switching dominates, which will in turn depend on parameters. This implies that the direction of the macroeconomic impact is uncertain.[45]

Some may prefer to think in terms of net foreign positions. For the U.S., this is the case of a net foreign debtor (it has net foreign liabilities), and where those foreign claims are denominated in dollars rather than foreign currency (think of foreign holdings of U.S. treasury bonds). Barbiero et al. (2017) consider this case, which they show is exactly analogous. Dollar appreciation raises the value of foreign claims on the United States when those claims are denominated in dollars. Americans, made poorer as a result, reduce their spending. Imports fall, export rise, and responses are made consistent with consumer preferences by less than proportionate appreciation of the dollar. The response of output and employment again depends on the relative size of the expenditure-switching and expenditure-changing effects, and the direction of the overall effect remains uncertain.[46]

Another thing omitted from early treatments was the central bank reaction function or policy rule. Early treatments of the effects of tariffs under flexible exchange rates took the money supply as fixed. This reproduced the Mundellian result that a tariff was contractionary, without the need for the Laursen-Metzler effect, because of negative real balance effects.[47] But if the central bank adjusts its policy rate and allows the money supply to vary in response to higher prices and the larger output gap (if it follows a Taylor Rule), the negative output effect will be attenuated and even eliminated. Indeed, if the central bank also leans against exchange-rate changes, it can end up more than offsetting those output effects. In this scenario we are effectively back in the pegged-exchange-rate case, where short-run output effects are positive. The central bank will have eliminated the asset-valuation effects described previously but reintroduced the product-market relative price effects. Neutrality fails either way.

A final thing omitted from early treatments is the government budget constraint. The second generation of models, post Mundell, introduced it, but with different assumptions about

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[42] The pioneering work here was Mundell (1968).

[43] Revenge of the Laursen-Metzler effect, one might say.

[44] Lindé and Pescatori (2017) show that an analogous result holds when international asset markets are complete (when there exists a set of Arrow-Debreu securities contingent on tariffs).

[45] This is the model analyzed in Eichengreen (1981).

[46] Working in a related context, Farhi, Gopinath and Itskhoki (2014) show that the standard neutrality result requires a country in this position to partially default on its external debt.

[47] Because a tariff put upward pressure on the CPI, it had a negative real balance effect; hence the contraction. Equivalently, the tariff had to be met by deflation, which increased real balances but reduced output and employment in a model with sticky money wages.

the disposition of the tariff revenues.[48] Most authors assumed that tariff revenues were rebated to consumers – equivalently, that they were used to finance a lump-sum tax cut.[49] Dornbusch (1987), in contrast, assumed that government retained the revenues and used them to reduce the budget deficit and/or pay down debt.[50] Baumann et al. (2017) make the same assumption in their simulations of an import tariff coupled with an export subsidy using the IMF's Global Integrated Monetary and Fiscal Model.

Which assumption one makes determines whether or not there are additional expenditure changing effects and therefore the likelihood of a positive or negative net impact on output and employment. It seems pretty clear which assumption is relevant to the U.S. in 2017-18: any additional revenue generated by a border adjustment tax would be used to finance other tax cuts. The revenues would effectively be rebated, in other words.

Those other tax cuts wouldn't be lump sum, of course. That's the whole idea behind the proposal for a border-adjustment tax, namely to move the United States toward a less distortionary tax system, with the goal of increasing the efficiency of resource allocation and making the country a more attractive place in which to invest. I note for completeness (and amusement) that if the new tax succeeds in achieving this goal and, as a result, investment rises relative to saving, the exchange rate will have to appreciate by *more* than 20 per cent in order to switch spending toward imported goods.[51] The post-tax relative price of imports will have to *fall* to switch some of the additional spending toward foreign sources, in other words. Which sectors are rewarded and penalized will be exactly the opposite of what is anticipated by critics of the BAT who worry that the exchange rate won't move by enough to offset its inter-sectoral impact, since in this case the exchange rate moves "more than enough." Firms like Walmart and Target could conceivably end up benefiting rather than losing.[52]

Some listeners will wonder, not unreasonably, whether a border adjustment tax is a good analogy for the effects of restrictive trade policy more generally. Trade restrictions, unlike the textbook border-adjustment tax, are rarely uniform and across the board.[53] A BAT is designed to move the economy in the direction of fewer distortions and enhance the efficiency of its supply side, where restrictive trade policies, because they are non-uniform, have the opposite effect. Some recent literature has considered these supply-side effects. For example, Barattieri, Cacciatore and Ghironi (2017) use high-frequency trade policy data from the Global Antidumping Database to analyze the dynamic effects of trade barriers. They show that restrictive trade policy shocks reduce output and raise prices while strengthening the trade

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[48] The same issues arise in the case of a border adjustment tax for a country with a trade deficit (where revenues from imports exceed rebates for exports).

[49] Equivalently, they assumed Ricardian equivalence.

[50] And he implicitly assumed that there was no Ricardian equivalence. Rose and Ostry (1989) adopt analogous assumptions in their benchmark theoretical analysis.

[51] This assumes, once again, that domestic goods are in less than perfectly elastic supply.

[52] In addition, the asset-valuation effects are likely to be even greater than in the base case considered above. But their impact on spending would be at least partially offset by the positive wealth effects of increased productive efficiency and higher investment.

[53] Some argue that the same is likely to be true of the border adjustment tax in practice, because for example it is hard to apply the rebate to exports of services.

balance at least modestly.[54] The effects of restrictive trade policies resemble those of negative supply shocks, in other words.

The authors then show that they can replicate the patterns in the data with a benchmark small-open-economy model with sticky nominal wages and a flexible exchange rate. A tariff, by raising import prices, pushes up the price level. But by switching spending toward domestic tradable goods, it also reallocates market share toward less efficient domestic producers.[55] Hence the negative supply shock. Consumers experience that shock as a reduction in their purchasing power, investors as a decline in the resources available for investment in physical capital and producer entry. The trade balance improves as a result of both expenditure switching and expenditure changing (more precisely, in this case, expenditure reduction). But this improvement comes at the cost of a recession.

3. Conclusion

Which brings me back, by way of conclusion, to the motivating policy question. Donald Trump has asserted that a more restrictive trade policy, involving tariffs and quotas, would help to achieve his goal of boosting U.S. economic growth to 3-plus per cent. But he has not indicated how the induced response of the exchange rate factors into his analysis. Others in Washington and academia have suggested that reforms of corporate taxation in the direction of a border-adjusted, destination-based cash-flow tax would be a more effective way of encouraging investment and boosting growth, and they have emphasized the induced response of the exchange rate as a reason why this tax would be efficiency enhancing rather than distorting.

In this lecture I have therefore revisited the effects of these policies in a world of internationally-mobile capital and flexible exchange rates.[56] I have done so from the perspective of short-term fluctuations, where we are essentially in the world of Mundell and Fleming, the name-holders of this lecture, and from the perspective of long-term growth.

In terms of short run impacts, the early Mundellian result that the impact of a tariff on output is exactly offset by induced appreciation of the exchange rate has been tempered by the introduction of additional supply- and demand-side considerations: firm entry and exit, asset-valuation effects, intertemporal budget constraints, monetary-policy reactions, and forward-looking behavior. All this is indicative of progress in economic modeling since the time of Mundell and Fleming, which at the technical level has been considerable. But while this additional complexity and realism relax their neutrality result, they don't provide much guidance on the direction of the changes in prices and quantities. I myself am inclined toward the view that there will be a negative short-term impact because of the combination of negative supply-side consequences, adverse asset-valuation effects, and the tendency for the exchange rate to start moving in anticipation of the adoption of import taxes. But that's simply a conjecture.

In the case of a border-adjustment tax, the idea that distortions will be avoided by offsetting appreciation of the exchange rate has similarly been challenged by adding asset-

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[54] They find the same thing when using lower-frequency trade policy data.

[55] This operates through the mechanism emphasized by Melitz (2003), who considered the case of a country that opens up to international trade, where more intense import competition causes less productive firms to exit, allowing only more productive firms to remain.

[56] Which, I like to insist, are really just two ways of saying the same thing, given the formidable challenge for most countries of pegging the exchange rate in an environment of high capital mobility.

valuation effects, anticipations, and monetary-policy reactions. Here it can be argued that many of these additional consequences – that a stronger dollar reduces the purchasing power of U.S. residents' foreign-currency-denominated assets and that central banks care about the exchange rate, for example – imply that the currency will rise less than proportionately in the short-run. But here too there are influences working in the other direction, rendering the net effect uncertain. All these are reasons to proceed cautiously if at all.

Turning to the long term, there is stronger professional consensus about the effects of external openness. Trade openness, according to that consensus, is positive for growth, while financial openness is more of a mixed blessing, in emerging markets and developing countries in particular, one should be embraced only when a country has reached a critical or threshold level of financial and institutional development.

As an economic historian, I remain uneasy with this conclusion. In the first age of globalization, before 1913, countries with low tariffs grew slower, not faster. Countries more dependent on foreign finance grew faster, not slower.

I interpret these observations as a reminder that the effects of policies toward the external sector are context specific. If trade policy and financial integration had different effects in the late 19th century, this was because historical circumstances were different. This point is well known and widely appreciated when it comes to policy toward capital flows. It informs the IMF's "new institutional view" of capital controls.[57]

The effects of trade liberalization and trade taxes, I have suggested in this lecture, are context specific as well. The short run effects of tariff protection will depend on the fiscal context (how the revenues are used), the monetary context (how the central bank reacts), the political context (whether the policy process is lengthy and the outcome is anticipated), and the financial context (how the currency composition of the assets and liabilities of residents and foreigners translates into capital gains and losses). The long-run effects will depend on whether the policy offsets or reinforces domestic distortions, something that can vary, as we've seen, across countries and over time. That tariffs were useful second-best policies for offsetting domestic distortions in the Atlantic economies in the 19th century is no guarantee that they would be useful second-best policies now, since the context is different. Again, this is reason to proceed, if at all, with considerable caution.

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[57] This view suggests that the advisability of removing or maintaining capital-account restrictions is context specific, that their removal should be contingent on, for example, prior steps to strengthen financial markets, institutions, regulation and policy sufficient to ensure that any induced threats to financial stability are limited. It suggests the benefits are likely to exceed the risks only if a country has reached a certain level or threshold of financial and institutional development, in other words. See IMF (2012).

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