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Fiscal Reforms, Long-term Growth and Income Inequality

by Santiago Acosta-Ormaechea, Takuji Komatsuzaki, and Carolina Correa-Caro

I N T E R N A T I O N A L M O N E T A R Y F U N D

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Fiscal Reforms, Long-term Growth and Income Inequality¹

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Abstract

We estimate the effects on growth of nine fiscal reform episodes in seven high-income countries using the Synthetic Control Method. These episodes are selected using an indicator-based approach applied to the evaluation of growth-friendly fiscal reforms during 1975-2010. We find that in reform countries the annual growth rate of real GDP was on average about 1 percentage point above their synthetic units 10 years after each respective reform. Moreover, countries which were initially less developed seemed to experience a larger growth impact after their reforms. Results are broadly robust to controlling for structural reforms on business regulation, financial market, labor market, and legal and product markets, which may also affect growth. Our findings also suggest that inequality is not affected by the growth-friendly fiscal reforms analyzed in this paper.

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I. INTRODUCTION

Raising long-term growth is a priority for the global economy to improve living standards while reducing poverty. Moreover, Berg and Ostry (2011) document that sustained growth is robustly associated with more equal income distribution. In this context, fine-tuning which specific government revenue and spending measures can achieve higher long-term growth, without compromising the sustainability of public finances, is particularly important at the current juncture. In fact, IMF (2016a) lists lifting long-term growth and making it more inclusive as one of the key priority areas within a broad-based policy effort to reinvigorate growth and contain the risks of reform reversals in the short and longer run.

In this regard, IMF (2015a) studies the effects of fiscal policy on growth using a battery of tools, and concludes that a well-designed package of tax and expenditure policies can be effective in raising long-term growth. IMF (2014, 2016b) also examines the role of fiscal policy, but focusing instead on its role in affecting inputs in the production function, which could have an additional growth impact through factor accumulation and increases in total factor productivity.

Without inclusion, however, growth is fragile and may not be long-lasting. Kumhof, Ranciere, and Winant (2015), for instance, have shown that excessive household leverage can be driven by changes in income distribution, and that this high indebtedness level could lead to financial crises. In fact, several years of widening disparities in income distribution were at the forerun to the most recent global financial crisis, which was in turn triggered by disruptions in a highly-leveraged mortgage market. Moreover, owing to the lackluster growth that followed the global crisis and the large disparities in income distribution still present in many economies, the world is witnessing sudden changes in established social contracts as reflected in the ongoing movements towards more nationalistic political regimes around the globe.

However, establishing the causal relationship among fiscal policy, growth, and inequality, is a complex exercise. First, the causation is likely to be bi-directional, as shown in Muinelo-Gallo and Roca-Sagalés (2013), and Ostry, Berg, and Tsangarides (2014). While changes in fiscal policies affect growth and income distribution, fiscal policies can also be affected by changes in the state of the economy and in how income is distributed. Second, there are factors other than fiscal policy that likely influence growth. For instance, growth-promoting structural reforms are likely to happen at the same time fiscal reforms take place, which creates a difficult identification problem. In this context, any observed change in economic activity cannot be easily attributed to fiscal policy decisions. Third, the growth effects of fiscal policy could be country-specific. For example, the impact of tax policy changes is likely to be different in countries with high levels of taxation relative to those where the tax burden is relatively low, as shown in Trabandt and Uhlig (2011).

In this paper, we aim to shed light on the causal relationship from fiscal policy to growth from a country-case study perspective. To do this, we use the Synthetic Control Method (SCM), developed in Abadie and Gardeazabal (2003), and Abadie, Diamond, and Hainmueller (2010). The SCM provides a data-driven procedure to construct a suitable non-treated counterfactual (i.e., the synthetic unit). A key advantage of the SCM is that it helps cope with the likely heterogeneous effects of fiscal reforms across countries by analyzing an individual economy separately, an advantage over standard panel regression methods where an average estimate is

instead obtained for a whole sample of countries. It can also address endogeneity issues arising from omitted-variable biases due to time-variant fixed effects.

The SCM approach was recently used in a related policy paper which studies the fiscal policy and growth nexus (IMF, 2015a).² As in that paper, we develop an indicator-based methodology to select the countries that undertook growth-friendly fiscal reforms during 1975-2010. However, we introduce several changes to enhance the quality of the estimations, while examining new dimensions. First, we revisit the criteria by which countries experiencing structural fiscal reforms are selected. While IMF (2015a) considers both quantitative and qualitative elements of fiscal policy and discretionary judgments to select the control group, we focus instead only on quantitative criteria to identify reform episodes and to select countries. Because the use of qualitative elements is subjective and to some extent debatable, the sole focus on quantitative indicators enhances transparency and is more consistent with the nature of the SCM, which advocates for reducing the discretion in the design of the study to avoid selection biases. Second, we restrict our sample of candidates to evaluate their fiscal reforms to high- and upper-middle-income countries, instead of a set of countries with a wide range of income levels. This enhances the quality of the synthetic unit given that we are choosing it from a pool of countries with a relatively homogeneous economic structure. This also allows us to use our quantitative criteria with more confidence, given that these countries tend to have more consistent data and over longer horizons. To identify more accurately the impact of structural fiscal policies on the economy, we also address explicitly the role of non-fiscal structural reforms (namely changes in business regulation, financial market, labor market, and legal and product markets), which may happen simultaneously with those in the fiscal front and could also be affecting growth. Finally, we also include income inequality as another dimension to be evaluated besides growth, and document how developments of different inequality indicators are affected by the identified fiscal reforms.

Turning to our main results, we show that our data-driven approach led us to select nine fiscal reform episodes in seven countries, which generally had positive effects on long-term growth. In particular, the average annual GDP growth rate 10 years after the fiscal reform started was on average higher in the fiscal reform country relative to its synthetic unit by about 1 percentage point, ranging from 0.1 percentage points for the German reform that started in 2003 to 4.3 percentage points for the Chilean reform that started in 1983.

We also observe that reform episodes in countries with a relatively lower initial level of development were associated with higher growth after the fiscal reform episode started. Placebo experiments confirm the robustness of baseline results for four out of the nine cases. They tend to be the ones whose growth effect in the baseline is larger. Results are borderline robust in three cases, but not robust in the two remaining cases. Although these placebo experiments suggest that caution should be taken when evaluating results, still two-thirds of the events are either robust or borderline robust to this assessment, a fact that provides support to our baseline findings.

² Newiak and Willems (2016) also use the Synthetic Control Method to study a related but distinct question, related to the macroeconomic effects of IMF programs in sub-Saharan Africa.

Importantly, our findings hold after controlling for non-fiscal structural reforms that took place *prior* to the fiscal reforms. Thus, the growth effects of the fiscal reforms remain even when we account for pre-fiscal reforms differences in non-fiscal areas. This does not imply that higher growth can be unambiguously attributed to any of the identified reforms, as many other structural reforms could take place *after* the fiscal reforms started. However, we did not obtain definitive evidence that non-fiscal structural reforms were stronger in the reformer countries relative to their synthetic units after the fiscal reforms started.

Finally, although there is a potential tradeoff between growth and inequality, because some reforms that increase efficiency may have adverse consequences in terms of income distribution (IMF, 2015a), we did not observe such a tradeoff in the fiscal reform episodes analyzed in this paper. More precisely, we did not find clear-cut evidence that fiscal reform countries in our sample had different inequality outcome relative to a global trend or their synthetic units.

The rest of the paper proceeds as follows. Section II describes the data, including a description of the country selection process and the SCM approach. Section III shows the main results, and the extent to which these are robust to the use of placebo experiments. Section IV provides additional robustness checks, including through the control of various structural reform indicators. In that section, we also assess the implications on inequality. Finally, Section V concludes.

II. COUNTRY SELECTION AND THE SYNTHETIC CONTROL METHOD

A. Selection of Reform Countries

The selection of country cases is in line with IMF (2015a), which uses a set of indicators identified as growth-enhancing in the academic literature and the IMF's extensive technical assistance experience, to identify significant and long-lasting fiscal reform episodes. However, we depart from the approach of that paper in several ways. For instance, we consider only quantitative indicators rather than a combination of quantitative and qualitative criteria, to provide a more objective basis for the country selection process and to avoid selection biases. We also select reform episodes from high- and upper-middle-income countries. This ensures a more homogeneous economic structure among the countries identified as being subject to structural fiscal reforms (treated unit), and those that qualify as not being exposed to such reforms (control group), improving the accuracy of our estimates. Moreover, looking only at countries with relatively high income levels allows us to rely solely on quantitative indicators, as sufficiently-long historical and consistent data exist only for these economies.

There are in total nine indicators considered here. These indicators are defined by considering the direction in which these should be changing to ensure a positive growth impact, as explained below. Indicators cover the following three fiscal reforms areas: the tax mix, the composition of public spending, and the overall fiscal balance (Table 1).

- The tax mix captures whether a country has re-balanced its taxes toward a more growth-friendly tax structure through a widening of the tax base, an increase (decrease) of standard rates, or a combination of tax base and rate changes. However, only shifts from

direct to indirect taxes are considered as having a growth-promoting impact, in line with recent empirical studies (e.g., Arnold and others, 2011).

- The composition of public spending evaluates whether a country has increased those outlays that are more likely to foster growth, such as physical investment, education, health and social protection (see Acosta-Ormaechea and Morozumi, 2017; Gosh and Gregoriou, 2008; Glomm and Kaganovich, 2008; and Gupta and others, 2005 for discussion).
- Furthermore, changes in the overall fiscal balance are also included, to provide an indication of the impact of fiscal policy on macroeconomic stability, since fiscal reforms can be growth promoting only in the context of sustainable public finances.

However, to reduce the risk of selecting outliers, countries reporting less than 20 years of data for a relevant fiscal indicator were excluded.³ In addition, we consider five-year non-overlapping averages to correct for the effects of business cycles fluctuations, starting in 1975 to 2010 or the latest available observation. Since reforms that promote long-term growth need to be sustained over time, the durability of the reform effort is controlled for by considering the change in the relevant fiscal variable over at least two consecutive five-year periods.

Reform countries are first selected by the number of reform indicators they satisfy. Thus, a country can satisfy at most nine reform indicators. Then we consider the regional breakdown of the sample. Specifically, following the IMF regional country classification, we select only those countries with the largest number of reforms in each of the following three country regions: European countries (EUR); Asian-Pacific countries (APD) and Western-Hemisphere countries (WHD).⁴ This selection process gives the seven countries considered here: Australia, New Zealand, Belgium, Ireland, Netherlands, Germany, and Chile (Table 2).⁵ Once countries are identified, we then define the exact year of the reform. This is done by reviewing the literature on the reform history of each country to define the year when a reform action started. Five of the seven countries overlap with (IMF, 2015a), and the reform year follows the identification of that paper. For New Zealand, we set the reform year as 1986, following OECD (1999) and Dalziel (2002). For Belgium, we set the reform year to 1992, following Carey (2003), IMF (1999), and IMF (2011).

³ In the case of the VAT standard rate, we lowered the threshold requiring countries to report at least 15 years of data, given the severe data limitations in the case of this variable.

⁴ Countries from AFR and MCD according the IMF regional classification were excluded because of insufficient number of high-income non-oil exporter countries within the region, making it difficult to construct a sufficiently accurate synthetic unit.

⁵ A relevant caveat is worth mentioning. Given the nature of the selection process considered here, only reforms that are implemented "sufficiently well" are considered, since only these reforms will have strong enough effects to be reflected in the data.

(continued)

Although seven countries are chosen, some of them could be exposed to more than one reform event, as observed in the cases of Australia and Chile.⁶

Table 1. Country-Case Selection Indicators

Indicators	Description	Source
Tax policy area		
Tax mix (direct-to-indirect tax ratio) ¹	Negative change over at least two consecutive five-year periods	OECD Tax Revenue Statistics and World Economic Outlook (WEO)
VAT standard rate (percent) ²	Positive change over at least two consecutive five-year periods	
Top corporate income tax rate (percent)	Negative change over at least two consecutive five-year periods	Tax Policy Division of the IMF's Fiscal Affairs Department
Top individual income tax rate (percent)	Negative change over at least two consecutive five-year periods	
Expenditure policy area		
Public capital spending (percent of GDP)	Positive change over at least two consecutive five-year periods	World Economic Outlook (WEO)
Public health spending (percent of GDP)	Positive change over at least two consecutive five-year periods	
Public education spending (percent of GDP)	Positive change over at least two consecutive five-year periods	Government Finance Statistics (GFS) and World Economic Outlook (WEO)
Public social protection spending (percent of GDP)	Positive change over at least two consecutive five-year periods	
Macroeconomic stability area		
Overall fiscal balance (percent of GDP)	Positive change over at least two consecutive five-year periods	World Economic Outlook (WEO)

Source: Author's definitions

¹ Direct tax denote taxes on income, profits and capital gains, social security contributions, recurrent taxes on immovable property, recurrent taxes on net wealth and other taxes on property; Indirect taxes denote taxes on payroll and workforce, taxes on goods and services and others.

² Although increases in VAT standard rates might not be per se growth enhancing, most countries that undertook such reform reduced the corporate and/or the personal income tax rates around the same time. Such combination of reforms is likely to have growth promoting effects. If VAT rate increases were removed from the selection criteria, three additional European countries and two additional Western Hemisphere countries should be chosen in addition to our selected countries.

⁶ Examples of fiscal reform actions include changes in PIT and social contributions to reduce tax wedge, often accompanied by labor market reforms, wage bill, pension, and subsidies reform to permanently contain expenditure and support fiscal consolidation, and the introduction of fiscal rules. (See Table AIV in Appendix 4 for details).

Table 2. Countries that Satisfy the Quantitative Criteria

Country¹	Income group²	# of reforms
European countries (EUR)		
Netherlands*	High Income: OECD	8
Ireland*	High Income: OECD	8
Germany*	High Income: OECD	8
Belgium*	High Income: OECD	8
Sweden	High Income: OECD	7
United Kingdom	High Income: OECD	7
Denmark	High Income: OECD	7
Finland	High Income: OECD	7
Greece	High Income: OECD	7
Hungary	Upper Middle Income: OECD	7
Italy	High Income: OECD	7
Portugal	High Income: OECD	7
Spain	High Income: OECD	7
Luxembourg	High Income: OECD	7
Austria	High Income: OECD	6
Israel	High Income: OECD	6
Slovenia	High Income: OECD	6
France	High Income: OECD	5
Asian-Pacific countries (APD)		
Australia*	High Income: OECD	6
New Zealand*	High Income: OECD	6
Korea	High Income: OECD	5
Western Hemisphere countries (WHD)		
Chile*	High Income: OECD	6
Canada	High Income: OECD	5

Note: (*) Selected countries.

Source: Author's calculations.

¹ Includes only OECD countries with at least five reforms episodes.

² World Bank's country classification by income is included, as this classification will be required to construct the comparator countries as explained below.

B. Selection of Comparator Countries

As part of the SCM (explained below), we also undertook the selection of countries in the control group to construct the so-called "synthetic unit" against which the effects of the fiscal reforms are assessed. Although the group of selected reform episodes includes only high-income OECD countries, the sample of those countries in the control group should necessarily go beyond the OECD to have a "sufficiently large" comparator base. Otherwise, the construction of a proper synthetic unit becomes difficult (see below). At the same time, we would like to retain the homogeneity of the control group to the extent possible. Thus, we consider high and upper middle income countries according to the World Bank's country group classification in this

broader sample, excluding oil exporting countries and small states.^{7,8} Table AI in Appendix 1 presents the full list of countries belonging to EUR, APD or WHD evaluated here, as well as their region and the number of reforms undertaken by each of them. It is important that the control group includes only those countries that did not undertake substantial fiscal reforms. In this regard, only countries which qualify as having five reforms or less according to the previous criteria are included in the control group.⁹

Once the comparator countries are identified, we group them in two types, following Billmeier and Nannicini (2013). Type A includes all countries that satisfy the above criterion within the whole pool of comparator countries. Type B includes only the subset that is in the same region as the country under consideration. After running the SCM for both types, we chose the type that provides the better pre-event match as the baseline case, where the better match is measured by the lower root mean squared error (RMSE) of the outcome variable (real GDP at constant 2005 prices (in million 2005 US\$) in our case). Specifically, type A was chosen for Australia, Germany, and New Zealand, whereas type B was chosen for Belgium, Chile, Ireland, and the Netherlands. Appendix 2 provides the full list of countries that are available as part of the comparator group for each of the seven countries.¹⁰

C. Synthetic Control Method

Brief description

The synthetic control method provides a data-driven methodology to quantify the effects of a particular event in comparative case studies. It creates an artificial counterfactual (or synthetic unit) that closely matches the economic characteristics of the unit of interest prior to the event, and compares the difference in outcomes between that unit of interest and the counterfactual

⁷ Oil exporting countries were excluded owing to the large volatility observed in their fiscal variables, which would have generated significant biases at the time of defining a threshold to measure fiscal reform episodes. According to IMF's Fiscal Monitor classification, the High and Upper Middle Income countries that are also oil exporters are: Algeria, Angola, Azerbaijan, Bahrain, Brunei Darussalam, Ecuador, Equatorial Guinea, Gabon, Iran, Iraq, Kazakhstan, Libya, Mexico, Norway, Oman, Qatar, Russia, Saudi Arabia, Turkmenistan, United Arab Emirates, and Venezuela.

⁸ According to the IMF, the High and Upper Middle Income small states are: Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Fiji, Grenada, Maldives, Marshall Islands, Mauritius, Montenegro, Palau, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Suriname, Tonga, Trinidad and Tobago, and Tuvalu.

⁹ In principle, the control group should include only those countries that did not undertake any reforms, as the inclusion of countries that had some fiscal reforms would lead to an underestimation of the growth effects. However, there is a drawback in making the selection criteria more stringent, as the resulting reduction in the number of countries in the control group makes it increasingly difficult to construct a proper counterfactual. To check the robustness of our results, however, we ran the SCM while limiting the control group to countries experiencing (i) four reforms or less; and (ii) three reforms or less. Comparing results across cases where we were able to: (a) solve the optimization problem; and (b) assess that the pre-event match did not worsen considerably (i.e., that the root mean squared error (RMSE) of the outcome variable is less than five times bigger than the RMSE in the baseline), we find that the positive growth effect remains while its size generally increases when the inclusion criteria become more stringent, suggesting that our baseline results may be underestimated. However, we were not able to obtain estimates that satisfy conditions (a) and (b) for cases when the candidates for the synthetic unit were limited to countries with two reforms or less.

¹⁰ Results for the unchosen type are available from the authors upon request.

after the event. The synthetic unit is interpreted as the potential outcome of the treated unit if it did not experience such event, as the treated unit and its synthetic unit are matched in both observable and unobservable predictors. Thus, the divergence of the outcome variable after the event is interpreted as the quantitative estimate of the effects of the event under consideration during a particular number of periods. The method was first introduced in Abadie and Gardeazabal (2003), and has gained popularity in recent years. Notable applications include Abadie and others (2010, 2014), Billmeier and Nannicini (2013), and Cavallo and others (2013). The method can capture the heterogeneity in the effects of the event as it obtains case-specific estimates, an advantage over standard panel regressions whereby an average estimate is obtained for the whole sample. It can also address endogeneity issues due to omitted-variable biases arising from time-variant fixed effect. However, it would still suffer from reverse causation if the decision to embark on fiscal reforms was affected by expectations on future growth prospects. Moreover, its estimate can still be biased by events that take place after the event, which may affect the unit of interest and its counterfactual differently. For example, Cavallo and others (2013) report that their estimate of the effect of catastrophic natural disasters on economic growth is biased by the radical political revolutions that followed the natural disaster only in the country of interest.

More precisely, the method first uses data prior to the event to create a counterfactual unit as a weighted average of the comparator units, using a nested optimization algorithm that minimizes the distance between the unit of interest and its counterfactual, in terms of both the outcome variable of interest and its predictors. The comparator units are chosen so that they are similar to the unit of interest but are unaffected by the event under consideration.¹² Once the counterfactual is created, the post-event outcome of the unit of interest is compared to the developments of such counterfactual. The estimated impact of the event is then represented by the difference between the two series of outcome variables over a specific period of time.

Implementation steps

Step 1: Choose potential comparator countries and explanatory variables

- Comparator countries are those that are as similar as possible to the country of interest, but did not experience the same event within the sample period.
- Predictor variables are those that are good predictors of the outcome variable of interest (real GDP at constant 2005 prices (in million 2005 US\$) in our case).¹³

As elaborated above, we use two types of comparator countries. As predictor variables in the initial selection of countries we use standard variables chosen in empirical growth regressions, namely: the level of GDP per capita (at the beginning, half-way, and the end of the pre-reform

¹² Inclusion in the comparator units does not imply inclusion in the counterfactual, as the comparator units could receive zero weights in the optimization described below. It is often the case that only a small number of units initially included in comparator units receive positive weights.

¹³ Alternatively, one can also choose real GDP per capita as the outcome variable. Main results hold for this alternative specification, although the growth effect will be negative in two cases (Chile 1974 and New Zealand 1986).

(continued)

period), trade openness, inflation rate, terms of trade and an index of human capital (see, Barro and Sala-i-Martin, 2004).

Step 2: Given the group of comparator countries and the outcome and predictor variables, we construct the relevant synthetic series as follows.¹⁴ The procedure calculates the weights of the comparator countries and predictor variables to create the counterfactual that is as close as possible to the unit of interest in the pre-event period. The method is based on a nested optimization algorithm as describe below.

Starting from an initial value of variable weights for the $K \times K$ diagonal matrix V , we choose the $J \times 1$ vector W^* of country weights that minimizes the distance $\|X_1 - X_0W\|$, where X_1 is a $K \times 1$ vector of pre-event averages of the K predictor variables for the unit of interest and X_0 is a $K \times J$ matrix of the pre-event averages of the K predictor variables for the J comparator units, respectively, subject to the constraints that the weights must be between zero and one.¹⁵ In particular, W^* minimizes the following distance in the pre-event period:

$$W^* = \operatorname{argmin}_{W \in \mathcal{W}} \|X_1 - X_0W\|_V = \sqrt{(X_1 - X_0W)'V(X_1 - X_0W)} \quad (1)$$

Once the optimal country weights W^* are chosen, the variable weight matrix V^* is also chosen among all positive definite and diagonal matrices, such that the mean square prediction error (MSPE) of the outcome variable is minimized over the pre-event period. Specifically, this process considers:

$$V^* = \operatorname{arg} \min_{V \in \mathcal{V}} (Z_1 - Z_0W^*(V))'(Z_1 - Z_0W^*(V)) \quad (2)$$

Where Z_1 is a $T_p \times 1$ vector of the time series of the outcome variable for the unit of interest, where T_p is the number of pre-event periods, and Z_0 is a $T_p \times J$ matrix where each column is the time series of the outcome variable for country j . The resulting matrix V^* is used as input in (1) for the next round of optimization to update W^* (see Abadie and others, 2011, for details). Using such weights, the synthetic unit to create a counterfactual path of the outcome variable *post-event* can be constructed.

Step 3: Comparing the actual and post-event outcome variables. As indicated previously, the difference between the two series can then be interpreted as the estimated impact of the event under consideration (assuming that all other factors potentially affecting the variable of interest have been properly controlled for).

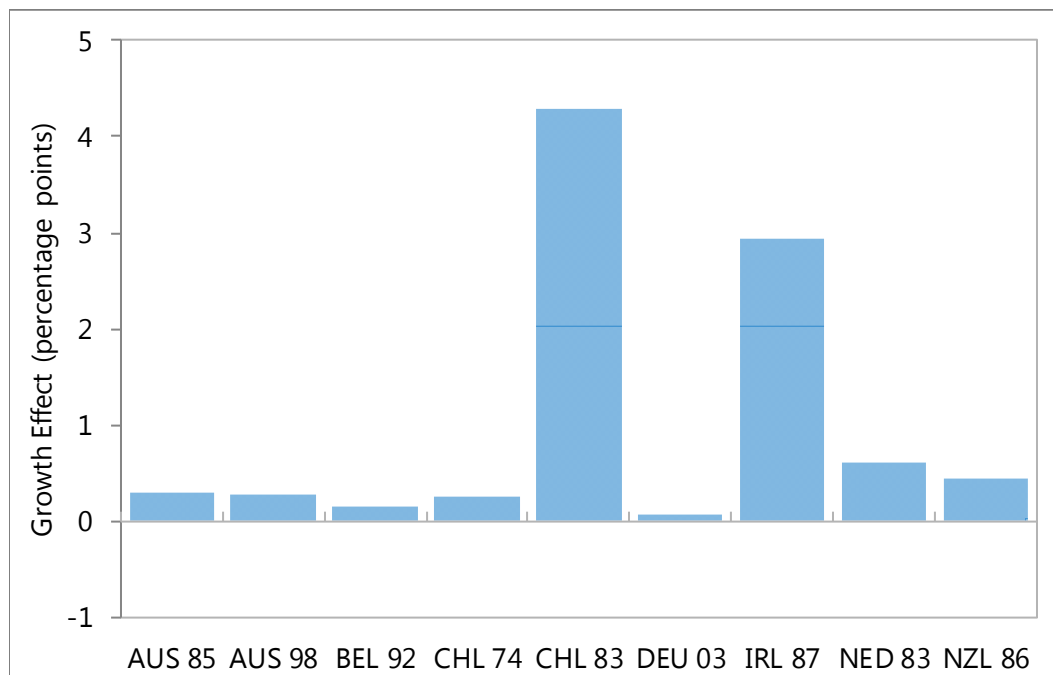
¹⁴ R, MATLAB, and Stata codes can be downloaded from <http://web.stanford.edu/~jhain/synthpage.html>.

¹⁵ Note that a pre-event average value is used for all K variables for both the unit of interest and its J comparators.

III. BASELINE RESULTS

Fiscal reforms have led to higher growth relative to the synthetic unit, in all reform episodes but with heterogeneity in the growth impact (Figure 1). In particular, average annual GDP growth for the 10 years after the fiscal reform started was higher in the reform country relative to its synthetic units by about 1 percentage point—ranging from 0.1 percentage point in 2003 for Germany to 4.3 percentage points in 1983 for Chile.¹⁶ The speed of the materialization of the growth effect also varied significantly. While growth accelerated quickly in Chile and Ireland, the growth effect remained more modest during the first few years in other cases (year-by-year results are summarized in Appendix 3).¹⁷

Figure 1. Growth Effects of Fiscal Structural Reforms: Baseline



Source: Author's calculations.

Note: Growth effects are defined as differences in average annual real GDP growth rates of the treated unit and its synthetic unit 10 years after the fiscal reforms started.

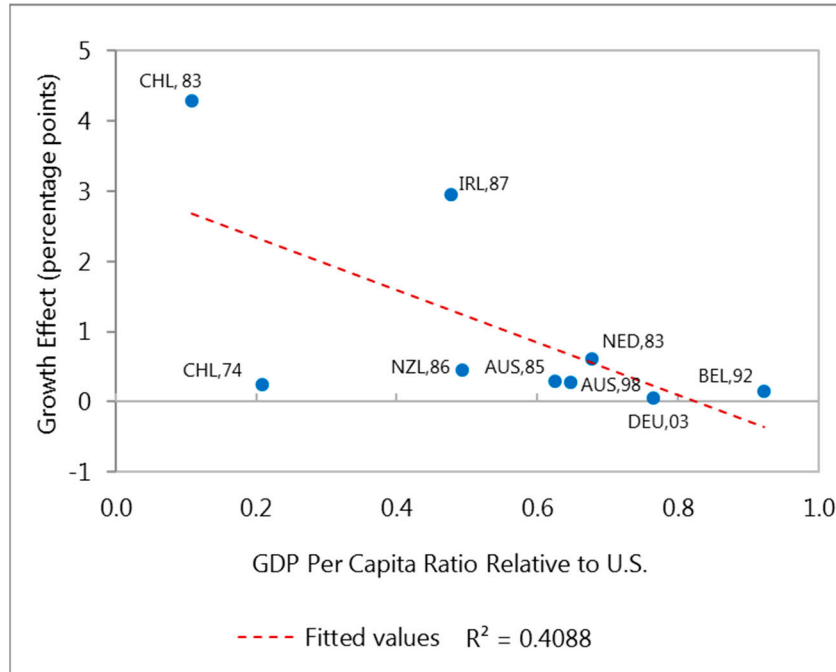
In terms of the size of the effects, we found that the episodes which took place in countries with a relatively lower level of development at the time of the fiscal reforms were associated with a higher growth effect afterwards (for instance, Chile 1983 and Ireland 1987). To formalize this,

¹⁶ The average growth impact is lower but still positive (0.3 percentage point), even when 1983 Chile and 1987 Ireland, the two cases with the largest growth effect, are excluded from the sample.

¹⁷ As we are aiming to assess the long-term growth effects of fiscal reforms, we evaluate the growth impact 10 years after the fiscal reform started. Reducing the time window for the assessment to either 5 or 8 years reduces somewhat the average magnitude of the effects, yet these are still positive. This is consistent with the fact that the materialization of the growth effects takes time. Growth effects considering different time windows are available from the authors upon request.

Figure 2 associates the GDP per capita relative to that of the US in the year the reform started with the subsequent growth effect. A lower GDP per capita ratio is broadly related to a higher subsequent growth effect, along the lines of what exogenous growth models would predict in terms of catching-up effects (Barro and Sala-i-Martin, 2004). These results broadly confirm that fiscal reforms could have different effects depending on the stage of development. Still, our sample is relatively small and it is true that many other factors could be at play, as highlighted by the very different growth effects of 1974 Chile and 1983 Chile, although the stage of development was similar in both cases.

Figure 2. Pre-Reform GDP Per Capita Relative to the US and After-Reform Growth Effect



Source: Author's calculations.

While the SCM does not allow for the use of standard inference techniques due to the lack of large sample properties, we use placebo experiments to assess the robustness of the baseline results, following Abadie and others (2010) (Appendix 5). The idea is to evaluate the likelihood that the growth estimate of the non-reform countries exceeds that of the reform country by running the SCM for each country in the control group and generating their "growth estimates" and comparing the resulting "growth estimates distribution" with the baseline growth estimate. When this likelihood (p-value) is high, the robustness of the baseline estimates can be put under question. About half of the baseline results are robust to placebo experiments, in the sense that the treated countries indeed show that the growth estimates after the reform episodes are not obtained by chance. This finding holds typically in those cases with the larger growth estimates under the baseline. In particular, very few placebo permutations are above the growth effects of the treated country ten years after the treatment, namely Belgium 1992 (1/4), Chile 1983 (0/8),

Ireland 1987 (0/3), and Netherlands 1983 (0/6).¹⁸ In contrast, baseline estimates are not robust for Chile 1974 (4/7) and Germany 2003 (20/21), as most placebo permutations show growth effects above that of the treated country. Australia 1985 (4/20), Australia 1998 (4/18), and New Zealand 1986 (5/19) are intermediate cases where baseline results are borderline robust. Although these placebo permutations suggest that caution should be taken when evaluating results, still two-thirds of the events are either robust or borderline robust to such assessment.

In addition, there are certainly other factors that could affect long-term growth besides fiscal policy. Structural reforms in non-fiscal areas are among the most relevant candidates, which we try to control for in the next section.

IV. NON-FISCAL STRUCTURAL REFORMS AND LINKS WITH INEQUALITY

A. Non-Fiscal Structural Reforms

The role that structural reforms in other areas, such as product market, labor market, business regulations, legal environment, and financial reforms play on long-term growth, have been well researched and documented in the literature.¹⁹ This implies that if the treated unit had more non-fiscal structural reforms than its synthetic unit in addition to the assessed fiscal reforms, the previous growth effects could be biased and overestimated.

However, the difference in non-fiscal structural reforms may have started *prior* to or *concurrent* with the analyzed fiscal reforms. To address the former case, we include non-fiscal structural reforms as additional growth predictors and re-run the SCM accordingly. This ensures that the non-fiscal structural reforms were similar between the treated unit and its synthetic counterpart *prior* to the fiscal reform events, thus controlling for the effects of non-fiscal structural reforms from the growth estimates. The list of the structural reforms considered are business regulations, financial reforms, legal reforms, labor market reforms, and product market reforms, following IMF (2008, 2015b). We add them one at a time for each episode.

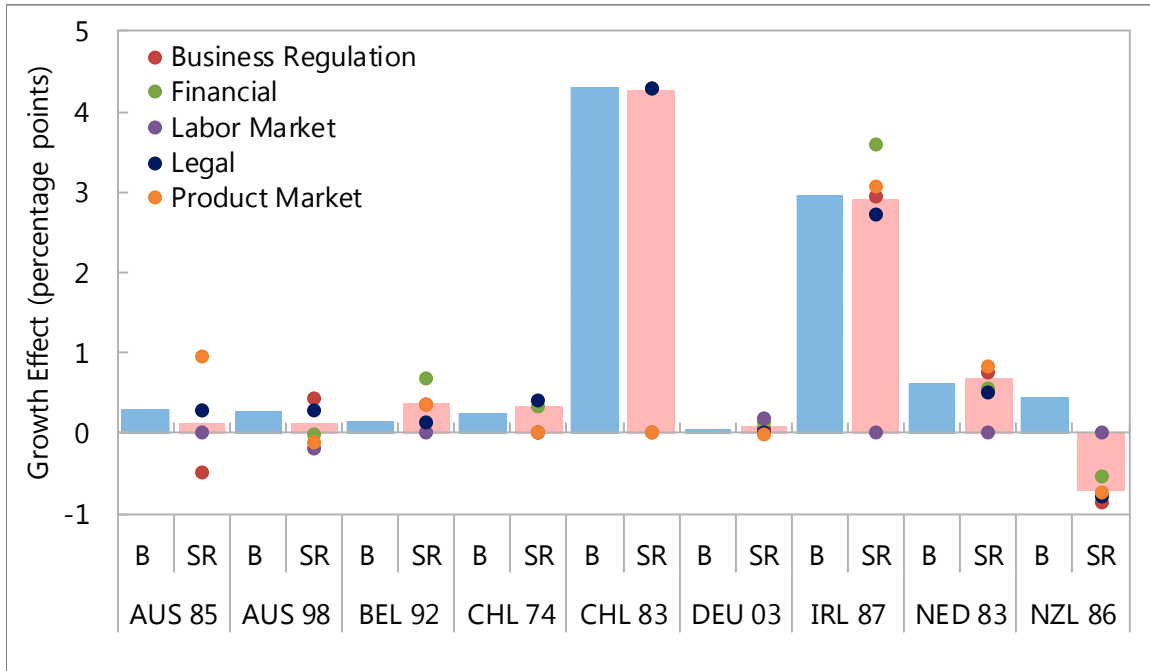
We cannot do the same when the non-fiscal reforms take place *simultaneously* or immediately *after* the fiscal reform episode, however. We instead document the developments of non-fiscal structural reforms *after* the fiscal reforms started, and test whether the difference in the strength of structural reforms between the treated unit and its synthetic unit is statistically significant.

¹⁸ For instance, Belgium 1992 (1/4) indicates that only one permutation out of four possible permutations shows a larger growth impact than that of the treated unit.

¹⁹ See Bouis and Duval (2011), and Prati and others (2013).

Non-fiscal structural reforms *prior* to fiscal reforms

Figure 3. Growth Effects: Baseline and Controlling for Non-Fiscal Structural Reforms



Source: Author's calculations.

Note: Blue bars indicate the baseline results (B), red bars non-fiscal structural reforms results (SR).

As explained, to control for the effects of differences in structural reforms *prior* to the fiscal reforms, we add a series of structural reform events as input to the SCM one-by-one each time, as an additional growth predictor.

Our baseline estimates of the growth effects are generally confirmed. Dots in Figure 3 represent the point estimates of the SCM results with the inclusion of different structural reform indicators, and pink bars take their average, weighted by the inverse of the RMSE, as similarly considered in Acemoglu and others (2016). Measured by the weighted average, these findings show positive growth effects which are broadly similar in magnitude to the baseline results. An exception is New Zealand 1986, for which the growth effect turns negative.²⁰ On average, output growth was higher by 0.9 percentage points relative to the control units, ranging from -0.7 percentage point in New Zealand 1983 to 4.3 percentage points in Chile 1983. Some of the point estimates in Australia 1985, Australia 1998, and New Zealand 1986 do show negative growth effects, however.

²⁰ This could be interpreted as a materialization of an omitted variable bias problem, in which the baseline estimation absorbed the effects of non-fiscal structural reforms.

Non-fiscal structural reforms concurrent with fiscal reforms

Part of the estimated growth effects may well reflect the impact of structural reforms that took place *simultaneously* or immediately *after* the analyzed fiscal reforms, which may not be properly captured through the previous approach. In particular, if the treated country engaged in a higher degree of structural reforms relative to its control group around the time of the fiscal reforms, then the SCM results would not correct for such effects and the overall results might be biased. To test for this possibility, we analyze the evolution of indices of non-fiscal structural reforms between the fiscal reform country and its synthetic units *after* the analyzed fiscal reforms started. Two types of exercises are undertaken.

First, we document ten-year changes in non-fiscal structural reform indicators and compare whether the treated or its synthetic unit had more of these reforms during the fiscal reform period. If the treated and synthetic units show similar developments, it indicates that the estimated growth effect is likely to be due to the fiscal reforms. In contrast, if the treated unit exhibits larger improvements in these non-fiscal structural reform indicators, we cannot rule out the possibility that the non-fiscal structural reforms contributed to the estimated growth effect. We use the weights derived in the SCM that included the pertinent reform as an additional growth predictor to construct the synthetic unit and the corresponding non-fiscal structural reform indicators. In other words, the weights differ depending on the reform. Second, we examine whether the treated unit also exhibits a stronger impact from non-fiscal structural reforms than its placebos during the fiscal reform periods. For this purpose, we construct “non-fiscal structural reform gaps” for each of the SCM permutation in the placebo experiments. The “non-fiscal structural reform gaps” are measured by differences in ten-year changes between the treated and synthetic unit in non-fiscal structural reform indicators. If the “non-fiscal structural reform gap” has high p-values, it suggests that the treated unit did not have non-fiscal structural reforms that were particularly stronger than its synthetic unit during the fiscal reform periods. We consider only the six cases for which the baseline growth effect was either robust or borderline robust in the placebo permutations. Moreover, we focus on business regulation and legal environment reforms due to data limitations.

Overall, results are not definitive regarding whether fiscal reform countries also had more non-fiscal structural reforms than their synthetic units *concurrent* with the fiscal reform episodes. Table 3 summarizes results for the first exercise. (More detailed developments of structural reform indicators are presented in Appendix 6.) In general, the non-fiscal structural reforms were more pronounced in the treated units but it was not predominant, as indicated in the last row of Table 3. Regarding the second exercise, p-values for the non-fiscal structural reforms are often large, suggesting the subdued role of non-fiscal structural reforms in the reform countries (Table 4). The p-values were also larger than those for growth effect for almost all cases, highlighting the likelihood that fiscal reforms were the key contributing factor of the assessed growth effects (Table 4).

Clearly, there is a more general issue which is the magnitude of the growth effect caused by the non-fiscal structural reforms, which may also vary across countries (i.e., because of differences in the implementation of a particular structural reform, country A could have a larger or lower

growth effects than country B, even though in principle the same structural reform is applied).²¹ Thus it still remains an open question to assess quantitatively how growth is affected by the non-fiscal structural reforms that take place *simultaneously* with the fiscal reforms analyzed here.

Table 3. Summary Comparison of Non-Fiscal Structural Reforms

Country Case	Average Percentage Change Difference in Index				
	Business Regulation	Financial	Labor Market	Legal	Product Market
Australia 1985	10.2	34.4	n.a.	1.9	1.3
Australia 1998	21.1	0.0	-17.6	-7.0	2.2
Belgium 1992	3.1	-40.3	n.a.	-23.8	-6.1
Chile 1974	n.a.	46.7	n.a.	-59.2	n.a.
Chile 1983	14.7	32.4	n.a.	2.8	n.a.
Germany 2003	11.0	n.a.	13.1	-3.3	-4.4
Ireland 1987	-18.5	18.0	n.a.	5.0	-4.3
Netherlands 1983	1.7	5.0	n.a.	1.2	-18.7
New Zealand 1986	9.6	-24.5	n.a.	7.9	-25.2
More Reform in Treated/Total ¹	7/8	6/8	1/2	5/9	5/7

Note: Figures reflect the difference in the average annual change in percent of the pertinent structural reform index, ten years after the start of the fiscal reform period, between the treated unit and its synthetic unit.

¹The numerator is the number of episodes for which the structural reform preceded more in the treated unit than its synthetic, while the denominator is the total number of episodes for which data was available. A positive difference for business regulations, financial and legal means the reform preceded more in the treated unit, while the opposite is true for labor and product market. Source: EPW, OECD, and author's calculations.

Table 4. Growth Effect and “Non-Fiscal Structural Reform Gap”

Growth effect in Placebo	Business Regulations	Legal System in Property Rights
Belgium 1992 (1/4 better than treated)	2/4 better than treated	3/4 better than treated
Chile 1983 (0/8 better than treated)	2/8 better than treated	4/8 better than treated
Ireland 1987 (0/3 better than treated)	2/3 better than treated	1/3 better than treated
Netherlands 1983 (0/6 better than treated)	1/4 better than treated	3/6 better than treated
Australia 1985 (4/20 better than treated)	7/20 better than treated	8/20 better than treated
Australia 1998 (4/18 better than treated)	1/18 better than treated	17/18 better than treated

²¹ See IMF (2016c), Adhikari and others (2016) and Bordon and others (2016) for recent estimates.

B. Inequality

As part of the structural fiscal reforms analyzed here, there is the possibility of a growth-inequality trade-off, whereby growth acceleration may come at the expense of increases in income inequality. One of our criteria for choosing fiscal reforms is the change in the tax mix from direct to indirect taxation. However, it is well documented that indirect taxes tend to be more regressive than direct taxes (e.g., Martinez-Vazquez, Moreno-Dodson, and Vulovic (2012)). Moreover, if improvements in the overall balance, another criterion chosen by us, come at the expense of a reduction in the transfers targeted to the relatively poorer segment of the population, such policies could also have negative effects on income distribution. Focusing on fiscal consolidation episodes, Ball and others (2013) and Woo and others (2013) show that fiscal consolidations typically raise inequality, especially when they are expenditure-based. At the same time, increases in health and education expenditure, two of our other criteria, may have the potential to reduce inequality (e.g., Martinez-Vazquez, Moreno-Dodson, and Vulovic (2012)).

Our approach in this subsection is to evaluate how fiscal reform countries fared on inequality relative to a global trend, and relative to their synthetic units. For instance, Immervoll and Richardson (2011) and Caminada, Goudswaard, and Wang (2012) report that between mid-1980s and mid-2000s, market-income inequality increased, being only partially offset by an accompanying increase in fiscal redistribution. We investigate whether the fiscal reform countries deviated from this global trend, and whether they had a different pattern relative to the synthetic units. In this regard, we intend to simply document the developments of inequality indicators using the country weights obtained in the baseline. Thus, we are not claiming any causal effects from fiscal reforms to inequality, but rather merely showing associations. We are also not making a welfare or normative evaluation of whether an increase in inequality is desirable or undesirable.

To proceed, we use Solt (2014)'s Standardized World Income Inequality Database (SWIID) and track developments in market income and net income Gini coefficients, which measure inequality of market-based income and that after fiscal redistribution effects (due to budget transfers and progressive taxation), respectively. Thus, an increase in inequality is represented by an increase in these coefficients. We focus on the seven cases where data are available, leading to the need to drop Chile 1974 and Netherlands 1983.

Income inequality relative to a global trend

On a first look, there is no deviation from a broader trend specific to countries which undertook fiscal reforms. While income inequality increased in most cases, fiscal redistribution still played an important role. Figure 4 documents the changes in Gini coefficients over time for all fiscal reform cases. It shows that both market income Gini and net income Gini increased in five out of the seven cases considering ten-year averages after the fiscal reform started (except for Chile 1983 and Ireland 1987).²² At the same time, the net income Gini coefficient either increased less or decreased more than the market income Gini coefficient in most cases (except for Belgium 1992 and Ireland 1987), suggesting an active role of fiscal policy to redistribute resources in the

²² Nine-year averages were considered for Germany 2003 as the Gini coefficient series ends in 2012.

(continued)

economy. Thus, the general tendency is that an increase in market Gini is partially offset by fiscal redistribution during the reform episodes analyzed here.²³

Income inequality relative to the Synthetic Units

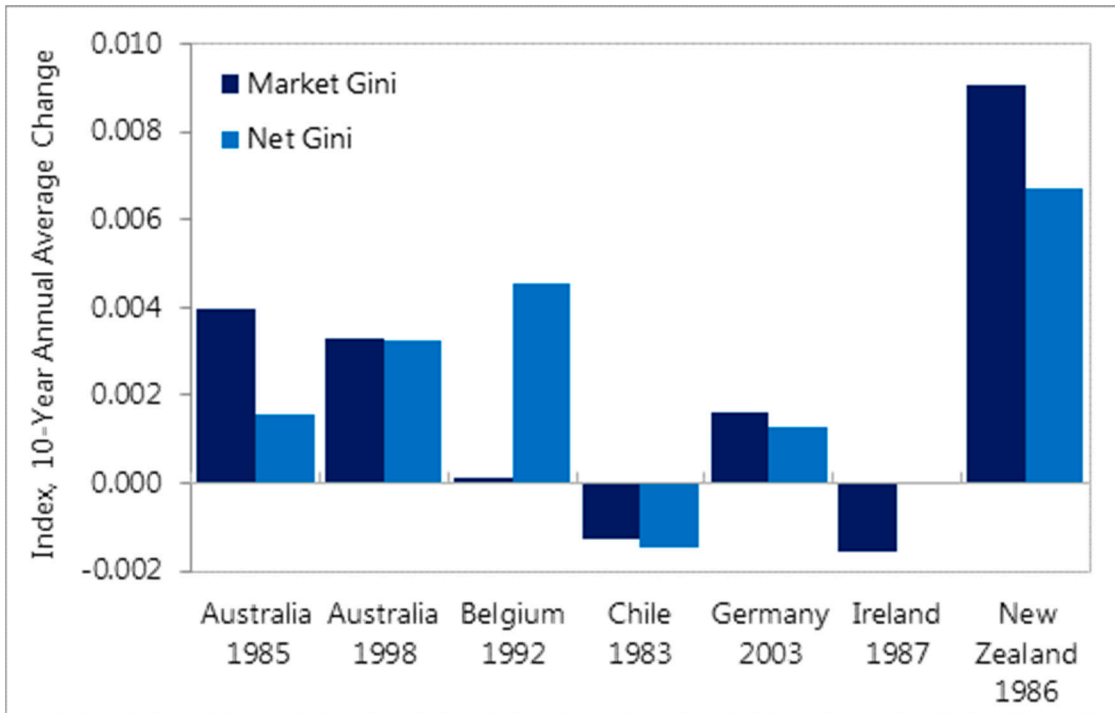
We also compare the developments of the Gini coefficients between the treated and the synthetic units to measure whether there are discernible differences. The idea is again to identify the marginal effects of fiscal reforms. The Gini coefficients for the synthetic units are constructed using a weighted average with weights obtained from the baseline SCM results. The assumption is that the synthetic unit in the baseline is similar enough to the treated unit, in the sense that it can be used also as a synthetic unit for the inequality indicators.²⁴

Results in Figure 5 suggest that market income Gini increased more in four out of seven reform cases relative to the synthetic units (i.e., Australia 1985, Australia 1998, Germany 2003, and New Zealand 1986). Fiscal redistribution also increased more in all four cases. For the cases in which market income Gini increased less than the synthetic unit, two of them (Belgium 1992 and Ireland 1987) also had the fiscal redistribution increasing less than the synthetic unit. Finally, in Chile 1983, fiscal redistribution increased more than the synthetic unit, although market Gini increased less. Thus, we do not observe a consistent pattern whereby fiscal reforms led to either higher market-income inequality, or that the fiscal redistribution function weakened more in countries which undertook the structural fiscal reforms analyzed in the paper.

²³ Income inequality is affected by broader trends such as technological changes and trade and financial globalization, as well as fiscal policies (Jaumotte and others 2013, and Dabla-Norris and others 2015).

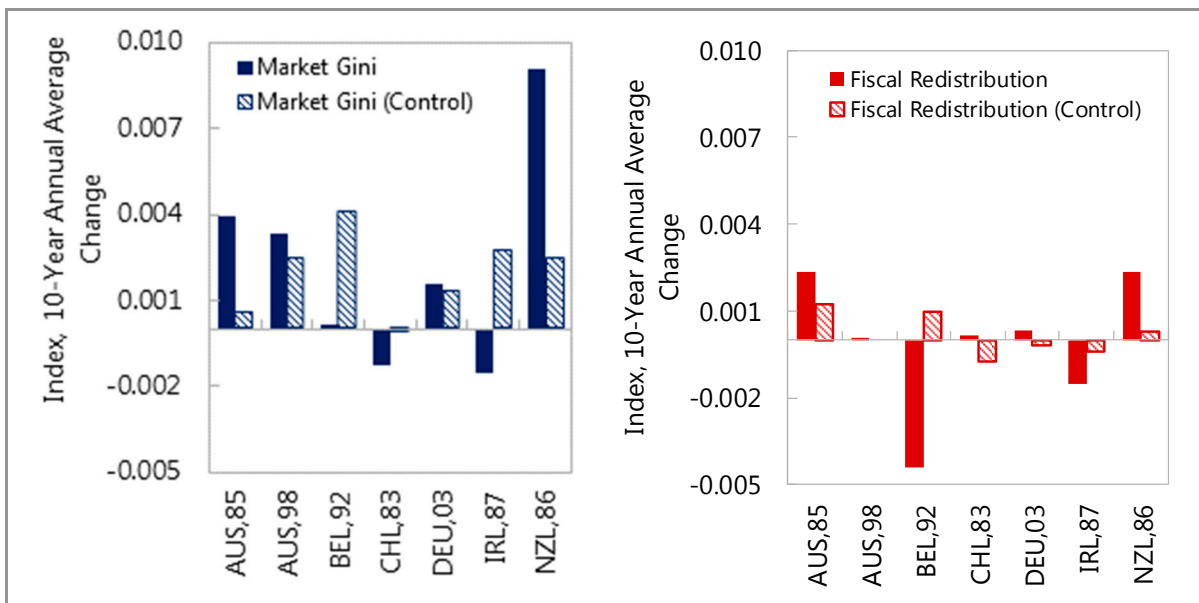
²⁴ To construct a more legitimate synthetic unit, it would be ideal to re-estimate the SCM using both growth and inequality as outcome variables, following Klobner and Pfeifer (2015). However, severe data limitations on the inequality indicators for the countries analyzed here did not allow us to do so.

Figure 4. Changes in Market and Net Gini Coefficients in Reform Episodes



Source: Author's calculations.

Figure 5. Changes in Market Gini Coefficients and Fiscal Redistribution, Treated vs Synthetic



Source: Author's calculations.

V. CONCLUDING REMARKS

We have shown that those countries identified as being exposed to growth-friendly fiscal reforms had experienced higher growth relative to their synthetic units. Although the size of the effects varies among reform episodes, it is broadly observed that those countries which were initially at a lower level of development experienced a larger growth impact. Results tend to be broadly robust to placebo permutations in most fiscal reform events. Also, as a key robustness check, we found that our main results remain broadly unaffected after controlling for various non-fiscal structural reforms prior to the fiscal reform events that could contribute to growth, namely business regulation, financial, labor market, legal and product market reforms. Moreover, we could not find definitive evidence that non-fiscal structural reforms were stronger in the countries that undertook the fiscal reform relative to their synthetic unit even after the reform period started.

From an inequality perspective, we could not find clear-cut evidence on whether those countries that went through the analyzed fiscal reforms experienced noticeable differences in their inequality indicators. That is, the possible tradeoff between growth-friendly fiscal reforms and inequality often discussed among policymakers, appears to be rather absent at the aggregate level in the evidence presented here. In fact, although in some cases the fiscal reform periods have coincided with increases in income inequality, there is no evidence pointing to any form of causality from structural fiscal reforms to a more unequal income distribution.

Although our findings provide convincing preliminary evidence about the long-term positive impact of structural fiscal reforms on growth, further analyses seem to be warranted to shed further light on the causal relation between fiscal policy and growth. More detailed considerations to help foster policy recommendations can also be considered. For instance, one relevant avenue to explore from a tax policy perspective could be to identify whether a broadening of tax bases (rather than changes in standard rates) has more desirable benefits from a growth perspective. Similarly, assessing the impact of structural expenditure measures, when controlling for the quality of the different spending categories, is a fruitful issue to be assessed, which can provide clear policy insights. To the extent that data availability permits, exploring those questions using the synthetic control method is an interesting and exciting area for future research.

Appendix 1. Country Selection

Table AI. Quantitative Reform Indicators

Country	Income group ¹	Number of Reforms
European countries (EUR)		
Netherlands*	High Income: OECD	8
Ireland*	High Income: OECD	8
Germany*	High Income: OECD	8
Belgium*	High Income: OECD	8
Sweden	High Income: OECD	7
United Kingdom	High Income: OECD	7
Denmark	High Income: OECD	7
Finland	High Income: OECD	7
Hungary	Upper Middle Income: OECD	7
Greece	High Income: OECD	7
Portugal	High Income: OECD	7
Italy	High Income: OECD	7
Turkey	Upper Middle Income: OECD	7
Spain	High Income: OECD	7
Luxembourg	High Income: OECD	7
Austria	High Income: OECD	6
Slovenia	High Income: OECD	6
Israel	High Income: OECD	6
France	High Income: OECD	5
Cyprus	High Income: non-OECD	5
Poland	High Income: OECD	4
Switzerland	High Income: OECD	4
Iceland	High Income: OECD	4
Czech Republic	High Income: OECD	4
Bulgaria	Upper Middle Income: OECD	4
Slovak Republic	High Income: OECD	2
Estonia	High Income: OECD	2
Belarus	Upper Middle Income	2
Lithuania	High Income	1
Malta	High Income	1

Note: (*) Selected countries.

Source: Author's calculations.

¹ World Bank's country classification by income.

Table AI. Quantitative Reform Indicators (Cont'd.)

Country	Income group ¹	Number of Reforms
Asian-Pacific countries (APD)		
Australia*	High Income: OECD	6
New Zealand*	High Income: OECD	6
Korea	High Income: OECD	5
Thailand	Upper Middle Income	5
Singapore	High Income	5
Japan	High Income: OECD	4
Malaysia	Upper Middle Income	3
China	Upper Middle Income	2
Hong Kong SAR	High Income	1
Western Hemisphere countries (WHD)		
Chile*	High Income: OECD	6
Canada	High Income: OECD	5
Uruguay	High Income	5
Panama	Upper Middle Income	5
Costa Rica	Upper Middle Income	4
Colombia	Upper Middle Income	4
United States	High Income: OECD	4
Dominican Republic	Upper Middle Income	4
Argentina	Upper Middle Income	4
Peru	Upper Middle Income	3
Jamaica	Upper Middle Income	3
Brazil	Upper Middle Income	2

Note: (*) Selected countries.

Source: Author's calculations.

² World Bank's country classification by income.

Appendix 2. Comparator Countries

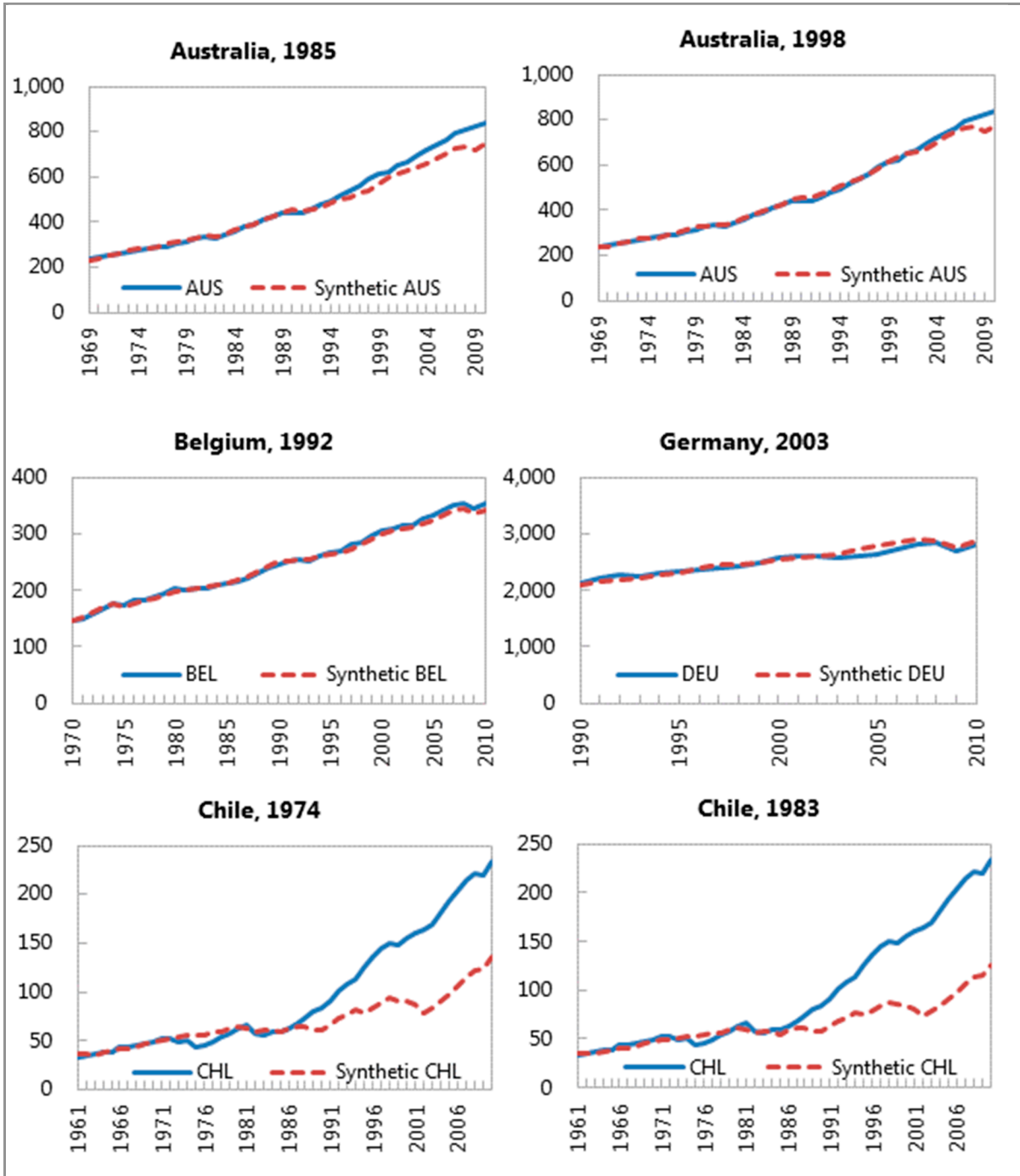
Table AII. Comparator Countries

Type A: Countries with less than 5 reforms.		
<i>Cases: Australia, Germany, and New Zealand</i>		
Albania	Czech Republic	Malaysia
Argentina	Dominican Republic	Malta
Belarus	Estonia	Panama
Bosnia and Herzegovina	France	Peru
Brazil	Germany	Poland
Bulgaria	Hong Kong SAR	Serbia
Canada	Iceland	Singapore
China	Jamaica	Slovak Republic
Colombia	Japan	Switzerland
Costa Rica	Korea	Thailand
Croatia	Latvia	United States
Cyprus	Lithuania	Uruguay
Type B: Countries with less than 5 reforms and are in the same region.		
<i>Cases: Chile</i>		
Argentina	Costa Rica	Peru
Brazil	Dominican Republic	United States
Canada	Jamaica	Uruguay
Colombia	Panama	
<i>Cases: Belgium, Ireland, and Netherlands</i>		
Albania	Czech Republic	Lithuania
Belarus	Estonia	Malta
Bosnia and Herzegovina	France	Poland
Bulgaria	Germany	Serbia
Croatia	Iceland	Slovak Republic
Cyprus	Latvia	Switzerland

Source: Author's calculations.

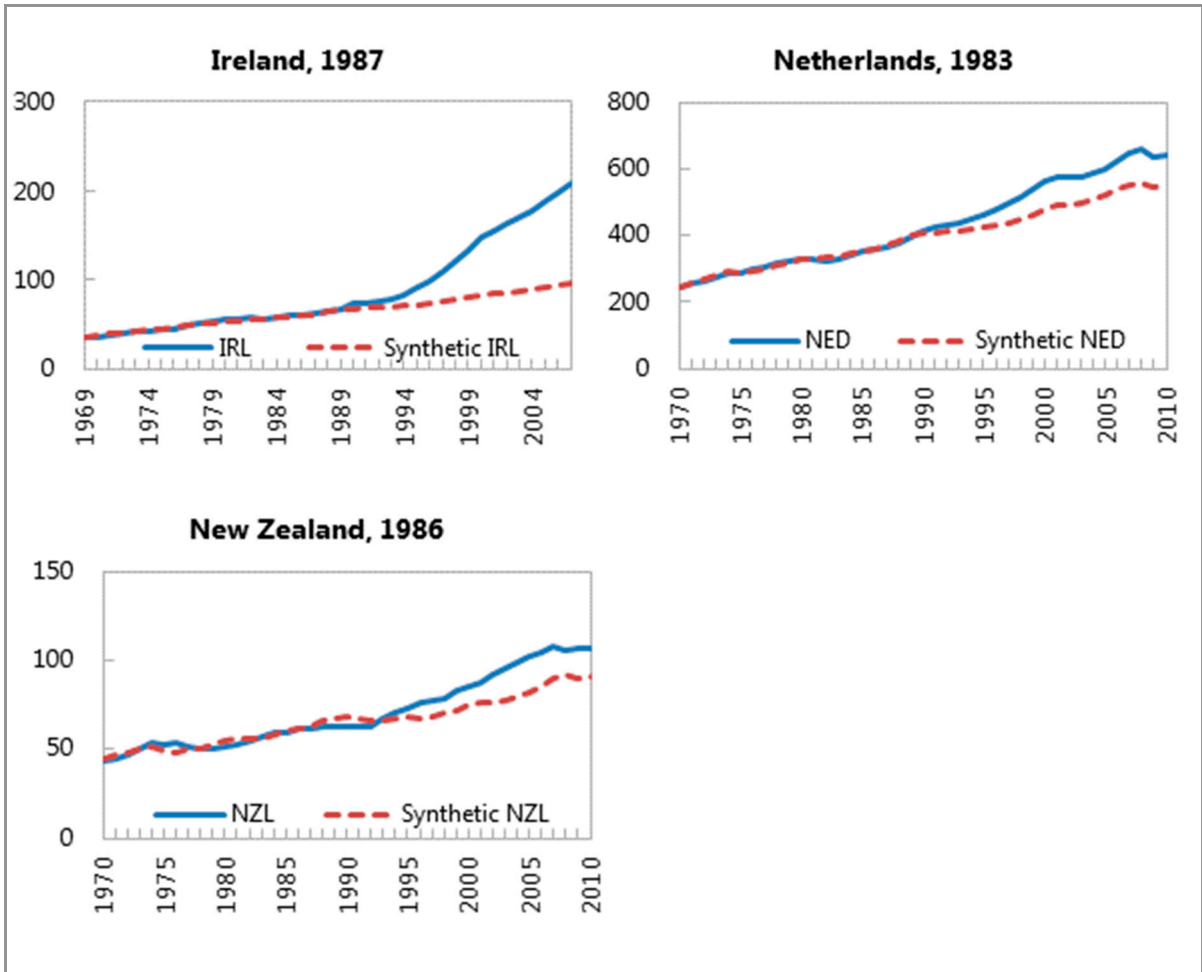
Appendix 3. Year-By-Year Charts of the SCM Baseline Results

Figure AIII-1. Year-by-Year SCM Baseline Results
(Real GDP at constant 2005 prices, in million US\$)



Source: Author's calculations.

Figure AIII-2. Year-by-Year SCM Baseline Results (Cont'd.)
 (Real GDP at constant 2005 prices, in million US\$)



Source: Author's calculations.

Table AIII. Country Weights of Synthetic Units

Country input Group	AUS		BEL	CHL		DEU	IRL	NLD	NZL
	1985	1998	1992	1974	1983	2003	1987	1983	1986
Albania						0.002		0.008	
Argentina				0.183	0.164				
Brazil									
Bulgaria						0.001		0.150	0.133
Canada	0.349					0.007			
Switzerland	0.551	0.264	0.235			0.006		0.566	0.227
China									
Colombia						0.002			
Costa Rica						0.002			
Cyprus			0.632			0.005	0.219	0.009	
Dominican Rep.		0.330				0.002			
France			0.134			0.015	0.044	0.181	
Hong Kong						0.004			
Iceland		0.302				0.004	0.737	0.011	0.640
Jamaica						0.002			
Japan						0.433			
Korea	0.099	0.060				0.005			
Malaysia						0.005			
Malta								0.056	
Poland								0.020	
Panama				0.193	0.058	0.007			
Peru						0.001			
Singapore						0.423			
Thailand						0.001			
Uruguay				0.624	0.779	0.002			
United States		0.044				0.073			

Note: Grey shadows indicate that a country is part of the final input group, but the final weight is zero.

Source: Author's calculations.

Appendix 4. Summary of Fiscal Reforms by Country

Table AIV. Main Fiscal Reforms by Country

Australia		
Reform Areas	Year	Reform Steps
1. Tariff Reform	1973 to mid-1980s	Unilateral and gradual reduction of trade tariffs and protectionism; reduction in trade taxes revenue.
2. Fiscal Consolidation, Tax Reform, and the "Trilogy of Fiscal Rules"	1985-86	Ceilings on revenues and expenditures as ratio of GDP. Fiscal consolidation efforts that resulted in a balanced budget by 1990. New taxes on capital gains. Reductions in tax expenditures and income tax cuts.
3. Pension Reform	1992-	Introduction of a three-tier fully funded pension system.
4. Intra-Governmental Cooperation	1992-	Creation of the Council of Australian Governments.
5. Product and Labor Market Reforms	1995-	New competition policy and move to a decentralized wage bargaining process.
6. Budget Honesty Act	1998-	Establishment of a fiscal transparency framework.
7. Introduction of GST	2000-	Introduction of a consumption based tax, new funding mechanism for states and territories, and removal of state taxes and fees.
8. Henry Review	2008-12	Establishment of Minerals Resource Rent Tax.
Belgium		
Reform Areas	Year	Reform Steps
1. Fiscal Consolidation	1992-	Expenditure-based consolidation reduced overall deficit from 8 percent of GDP in 1992 to a balanced budget in 2000.
2. Tax reform		
PIT	1989	Reduction of top rate from 67 percent to 55 percent, indexation of tax brackets and threshold for taxable income.
Social Security Contributions	1993-2000	Reduction in employers' rates.
CIT	1983-91	Reduction from 48 to 39 percent between 1983 and 1991.
	1993-	Broadening of tax base.
3. Spending Reform	1988-	Fiscal Federalism Reform and subsequent intergovernmental fiscal agreements helped maintain fiscal discipline.
Germany		
Reform Areas	Year	Reform Steps
1. Fiscal consolidation	2003-	Expenditure-based fiscal consolidation reduced overall fiscal deficit from 4 percent of GDP in 2003 to a 0.2 percent of GDP surplus in 2007.
2. Tax Reform		
PIT	2005-	Top rate reduced from 48 percent to 42 percent in 2005.
CIT	2008-	Reduced from 25 percent to 15 percent in 2008.
VAT	2007-	Raised from 16 percent to 19 percent in 2007.
3. Spending Reform		
Health Care Reform	2004, 2007-09	Increase in copayments, limits on dental coverage (2004).
Pension Reform	2004, 2007	Linking benefit levels to old-age dependency ratio (2004); raising statutory retirement age from 65 to 67 (2007).
Entitlement Reform	2005-06	Tightening of eligibility and maximum duration of unemployment benefit; merge of long-term unemployment and social assistance.
4. Labor Market Reform		
Active Labor Market Policy	2003-05	Deregulation of part-time work; streamlining of job protection regulation; and improvement in job intermediation.

Table AIV. Main Fiscal Reforms by Country (cont.)

Chile		
Reform Areas	Year	Reform Steps
1. Fiscal consolidation	1974-79	Expenditure-based consolidation brought primary fiscal deficit from 23 percent of GDP in 1973 to a 5 percent surplus in 1979.
	1983-89	Expenditure-based consolidation brought primary fiscal balance from a negligible deficit in 1982 to a 9 percent surplus in 1989.
2. Tax reform		
PIT	1974-79	Temporary one-year increase followed by a reduction of the top rate from 60 to 58 percent; replacement of proportional tax on labor income by a progressive tax arrangement.
	1983-89	Top rate reduced from 58 percent to 50 percent.
VAT	1975	Introduction of broadly-based VAT with general rate of 20 percent and initial exemptions for certain basic goods.
	1983-89	Reduction of general rate to 18 percent.
Custom duties	1974-79	Revision to tariff structure to achieve by 1979 a uniform import tariff of 10 percent with some exceptions; quantitative restrictions eliminated.
CIT	1983-89	Top rate reduced from 50 percent in 1983 to 35 percent in 1989; near elimination of the tax on retained profits.
3. Spending reform		
Civil service	1974-79	Wage restraint and reduction of public employees.
Subsidies	1974-79	Reduction facilitated by privatization of SOEs and reversal of previous expropriation of enterprises.
Primary current expenditure	1983-89	Reduction from 25 percent of GDP in 1982 to 17 percent in 1989.
Public investment	1974-79	Reduction from 8 percent of GDP in 1973 to 3 percent in 1979; efforts to protect most productive investment projects.
	1983-89	Increase from about 2 percent of GDP in 1982 to about 3 percent in 1989.
Education and Health	1974-79	Increase in spending on primary and secondary education, and primary care expenditure.
4. PFM and revenue administration		
Budget process	1975	Adoption of single treasury account; strong coordination of macro framework and the budget process.
Revenue administration	1974-79	Improvement of enforcement and tax collection processes, including by streamlining filing and payment procedures.
Copper Stabilization Fund	1985	Adoption of the fund to shield the budget from copper prices' volatility.
5. Labor market	1979	New labor plan for collective bargaining.
	End-1982	Removal of full wage indexation.
6. Privatizations	1974-79	Sale of more than 500 SOEs.
	1983-89	Sale of about 80 SOEs.

Table AIV. Main Fiscal Reforms by Country (cont.)

Ireland		
Reform Areas	Year	Reform Steps
1. Fiscal Consolidation	1987-	Substantial cuts in public-sector spending.
	2008-	Tax increases and base broadening (1/3); expenditure cuts (2/3).
2. Tax Reform		
PIT	1987-	Top rate reduced from 65 percent in 1985 to 42 percent in 2001.
CIT	1987-	Reduced from 50 percent in 1987 to 12.5 percent in 2003.
Capital Gains Taxes	1987-	Reduced from 60 percent in 1985 to 20 percent in 2001.
3. Labor Market Reform		
Wage Bargaining	1987-	Debut of the Social Partnership agreements which continued until they collapsed in 2009.
4. Public pension	2009	Pension levy; changes to retirement age; and reduction of benefits.
5. Education	1967-	Expansion of education system.
6. Economic Openness	1958-	Industrial Development Agency created; import levies removed; and tax concession for manufacturing exporters incorporated.
Netherlands		
Reform Areas	Year	Reform Steps
1. Fiscal Consolidation	1982-	Expenditure-based consolidation reduced overall fiscal deficit from 6 percent of GDP in 1982 to a 2 percent of GDP surplus in 2000.
2. Tax Reform		
Social Security Contributions		Reduction in employers' contributions, in particular for low-skilled workers and long-term unemployed.
PIT	1990-	Reduction in top rate from 72 to 60 percent in 1990 and to 52 percent in 2001.
CIT	1985-	Reduction from 50 to 42 percent between 1982 and 1986 and to 32 percent in 2005.
3. Spending Reform		
Wage Bill	1983-	Reduced from 13.6 percent of GDP in 1982 to 9.5 percent in 2000.
Entitlements	1984-	Reduction in unemployment and disability benefit replacement rates in real terms; tightened access criteria.
4. Labor Market Reform		
Wage Bargaining	1982-	Wage bargaining was decentralized, consensus around wage moderation.
Minimum Wages	1984-	Frozen in nominal terms for most 1980s, decreased in real terms.
Wage Indexation	1982-	Automatic price indexation virtually disappeared by mid-1980s.
Non-wage measures		Tax wedge for low-paid workers declined substantially.
Social security reform	1986-	Privatization and decentralization of social security system
5. Fiscal Institutions	1983-	Overall balance rule in 1983, amended to expenditure rule in 1994.

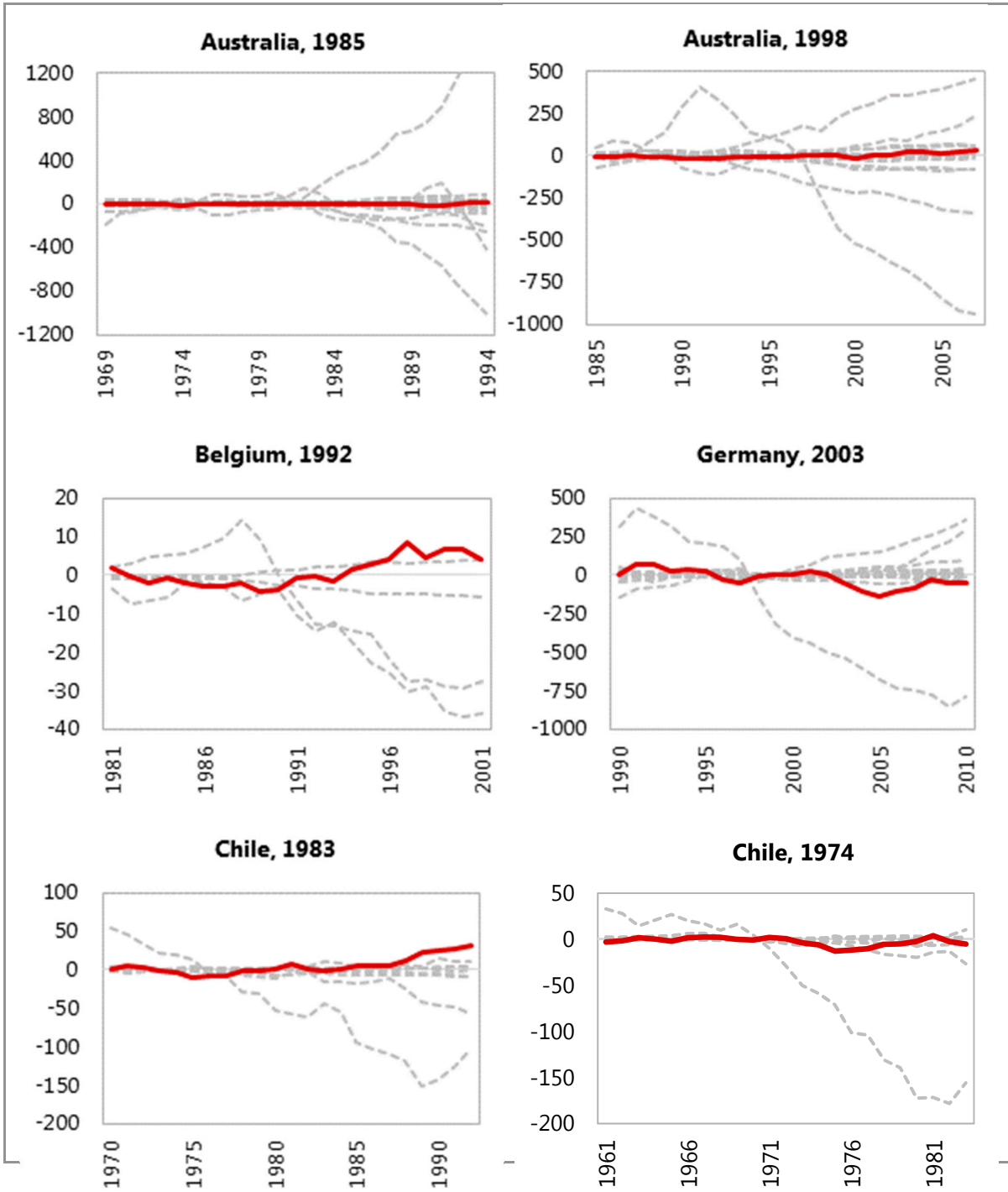
Table AIV. Main Fiscal Reforms by Country (cont.)

New Zealand		
Reform Areas	Year	Reform Steps
1. Fiscal Consolidation	1985-	Expenditure-based consolidation reduced overall balance from 6.3 percent of GDP in 1985 to 2 percent in 1989.
2. Tax Reform		
CIT	1989-	Reduction from 48 to 33 percent between 1988 and 1990.
PIT	1985-	Reduction in top rate from 66 percent to 33 percent between 1985 and 1989. Brackets reduced from five to three.
VAT	1986-	Sales and other indirect taxes replaced by broad-based GST.
3. Spending Reform	1985-	Reduction in government expenditure and public sector management reform.
4. Labor Market Reform	1991	Voluntary unionism; deregulation of employer-employee bargaining process.
5. Fiscal Institutions	1994	Fiscal Responsibility Act established medium-term fiscal framework and enhanced fiscal reporting.
6. Privatization	1986-	Privatization in broad industries, including transport, finance, tourism, forestry, broadcasting, utilities and services.

Sources: IMF (2015a), OECD (1999), Dalziel (2002), Carey (2003), IMF (2001), and IMF (2011).

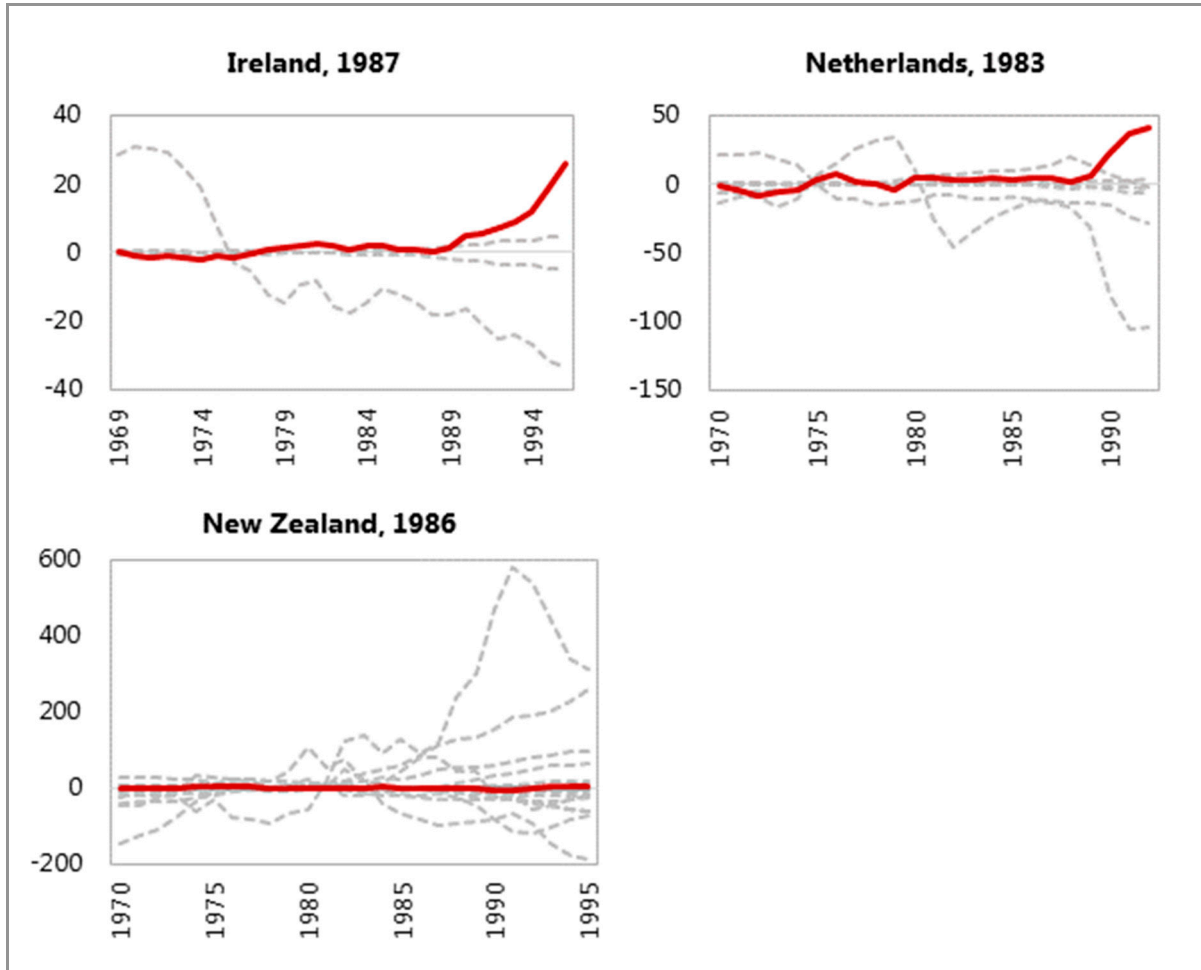
Appendix 5. Placebo Experiments

Figure AV. Placebo Experiments
 (Real GDP at constant 2005 prices, in million US\$)



Source: Author's calculations.

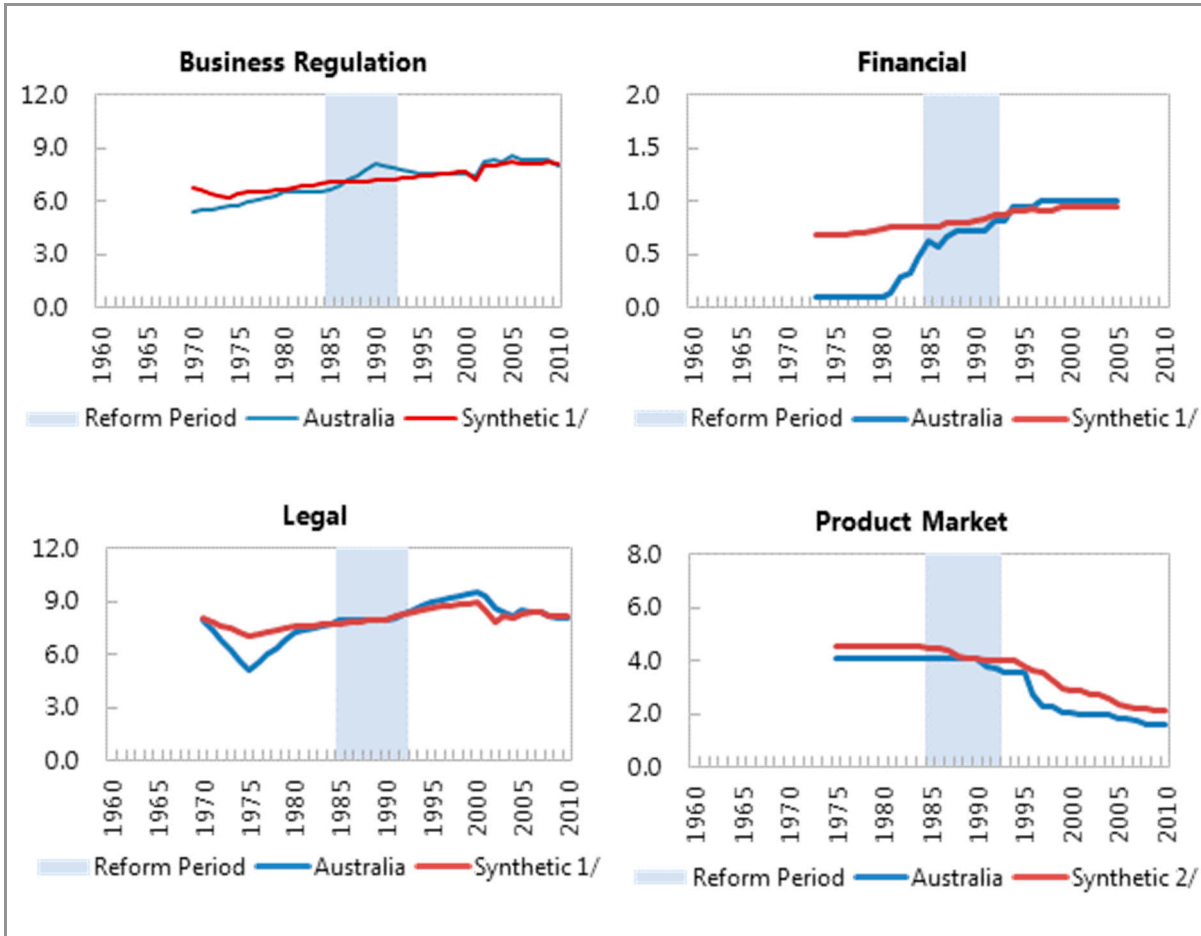
Figure AV. Placebo Experiments (cont'd.)
(Real GDP at constant 2005 prices, in million US\$)



Source: Author's calculations.

Appendix 6. Structural Reforms

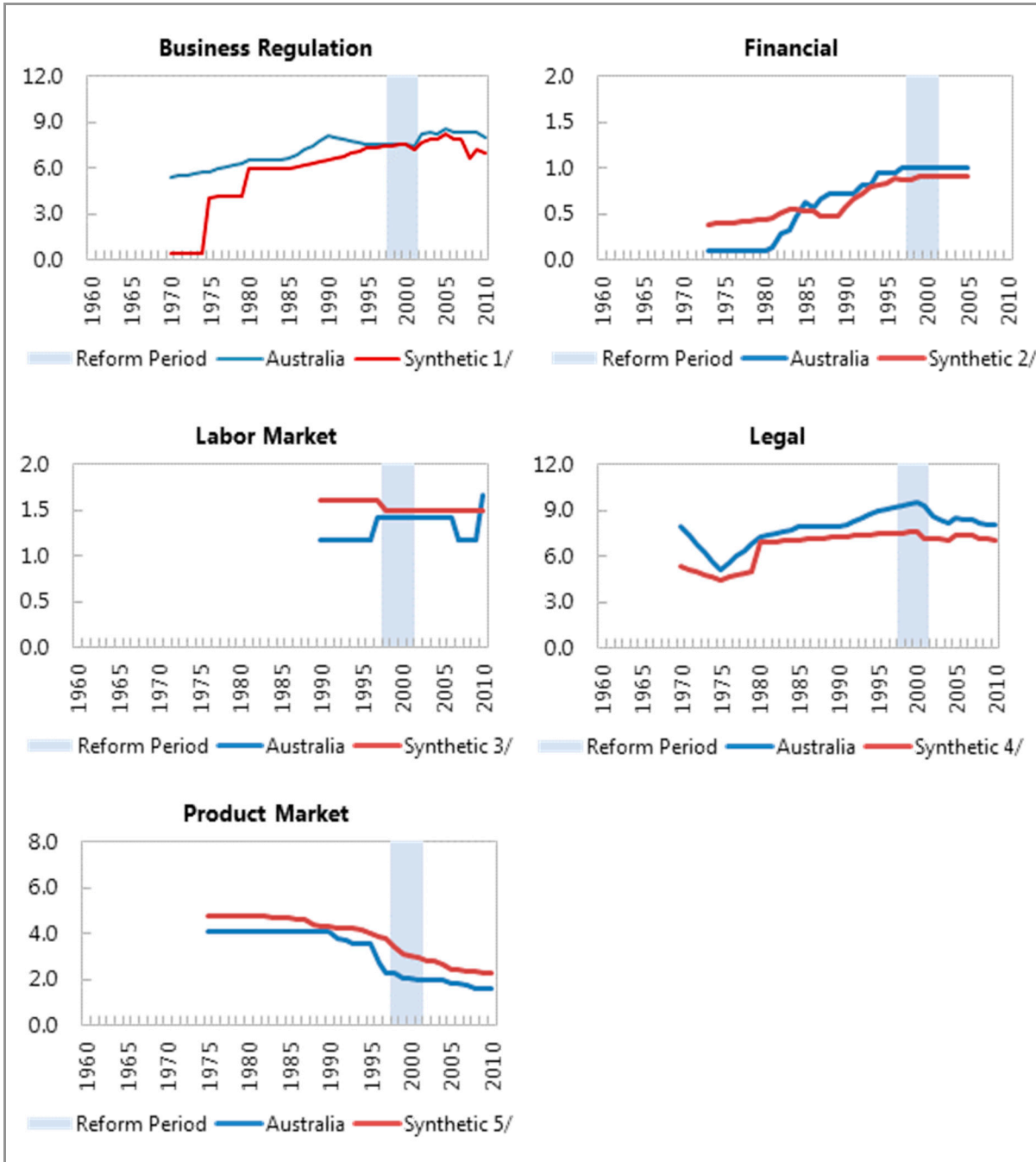
Figure AVI-1. Australia, 1985: Non-Fiscal Structural Reform (Index)



Source: EPW, OECD and author's calculations.

¹Switzerland, Canada, Korea and Albania. ²Switzerland and Canada.

Figure AVI-2. Australia, 1998: Non-Fiscal Structural Reform (Index)

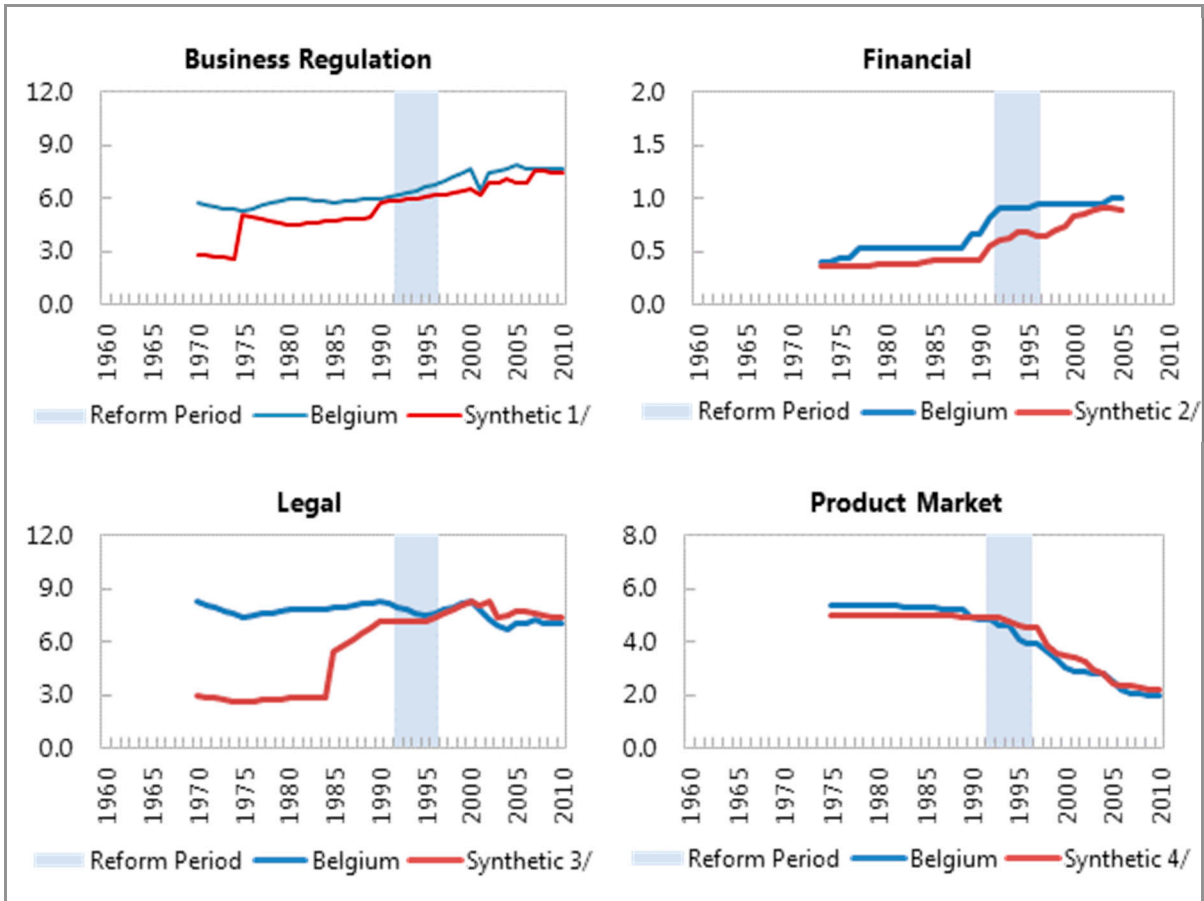


Source: EPW, OECD and author's calculations.

¹Iceland, Dominican Rep., United States, and Korea. ²Switzerland, Peru, Korea, United States, and Costa Rica.

³Switzerland, Canada, and Korea. ⁴Iceland, Dominican Rep., Switzerland, Korea, and United States. ⁵Switzerland, Canada, and Korea.

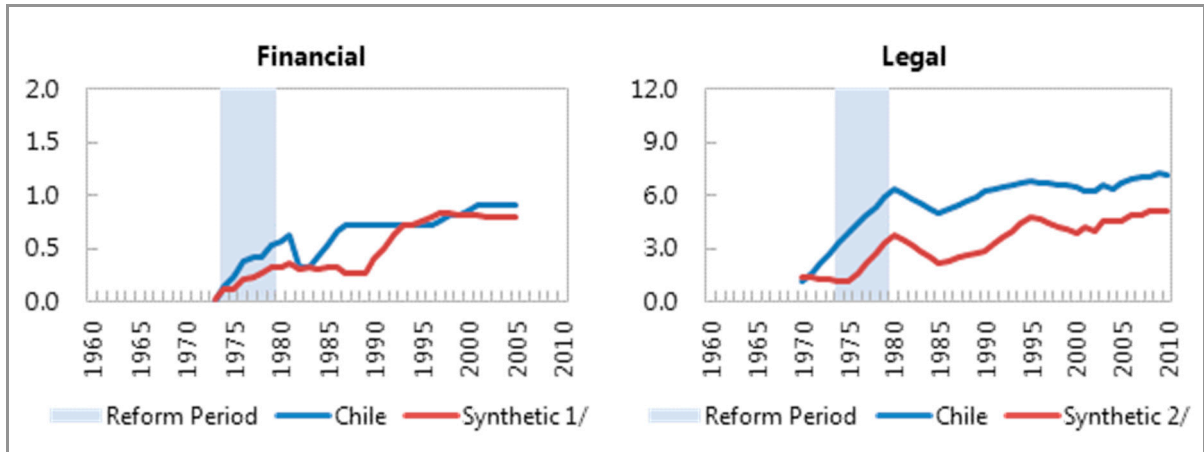
Figure AVI-3. Belgium, 1992: Non-Fiscal Structural Reform (Index)



Source: EPW, OECD and author's calculations.

¹Cyprus, Switzerland, Bulgaria, France, and Iceland. ²Bulgaria, Switzerland, and France. ³Cyprus, Switzerland, and France. ⁴Switzerland, Iceland, and France.

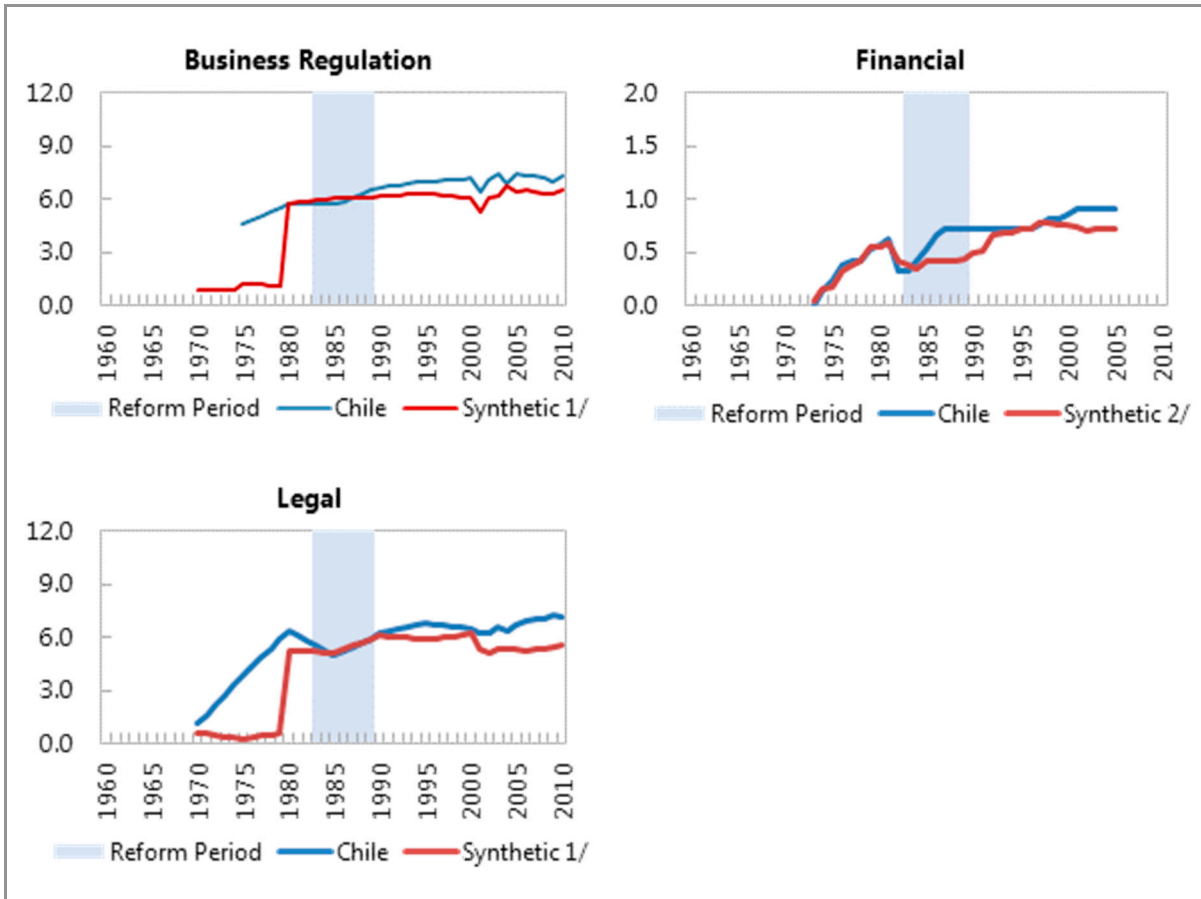
Figure AVI-4. Chile, 1974: Non-Fiscal Structural Reform
(Index)



Source: EPW, OECD and author's calculations.

¹Uruguay, Peru, and Argentina. ²Peru.

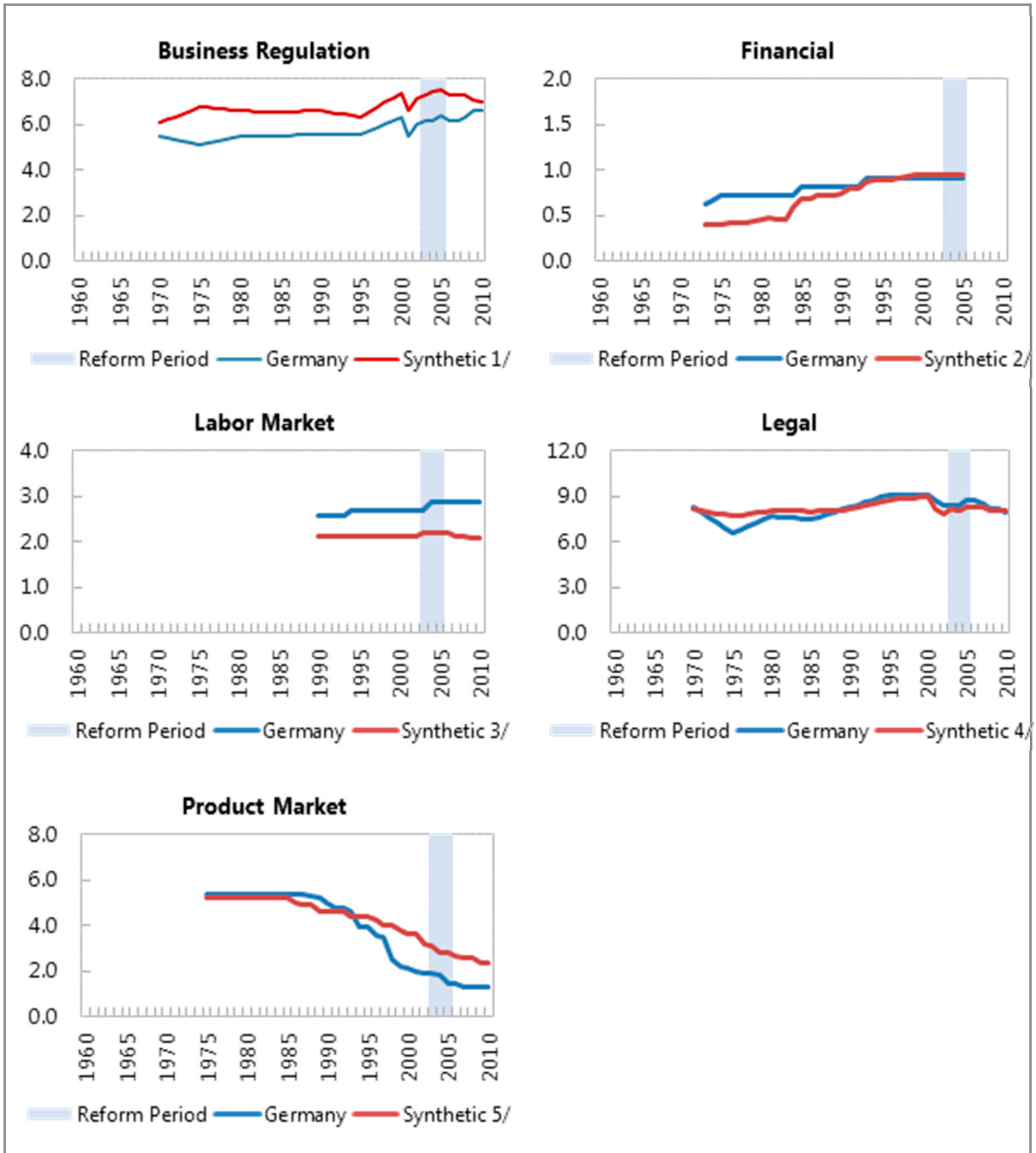
Figure AVI-5. Chile, 1983: Non-Fiscal Structural Reform (Index)



Source: EPW, OECD and author's calculations.

¹Uruguay, Argentina, and Panama. ²Uruguay, and Argentina.

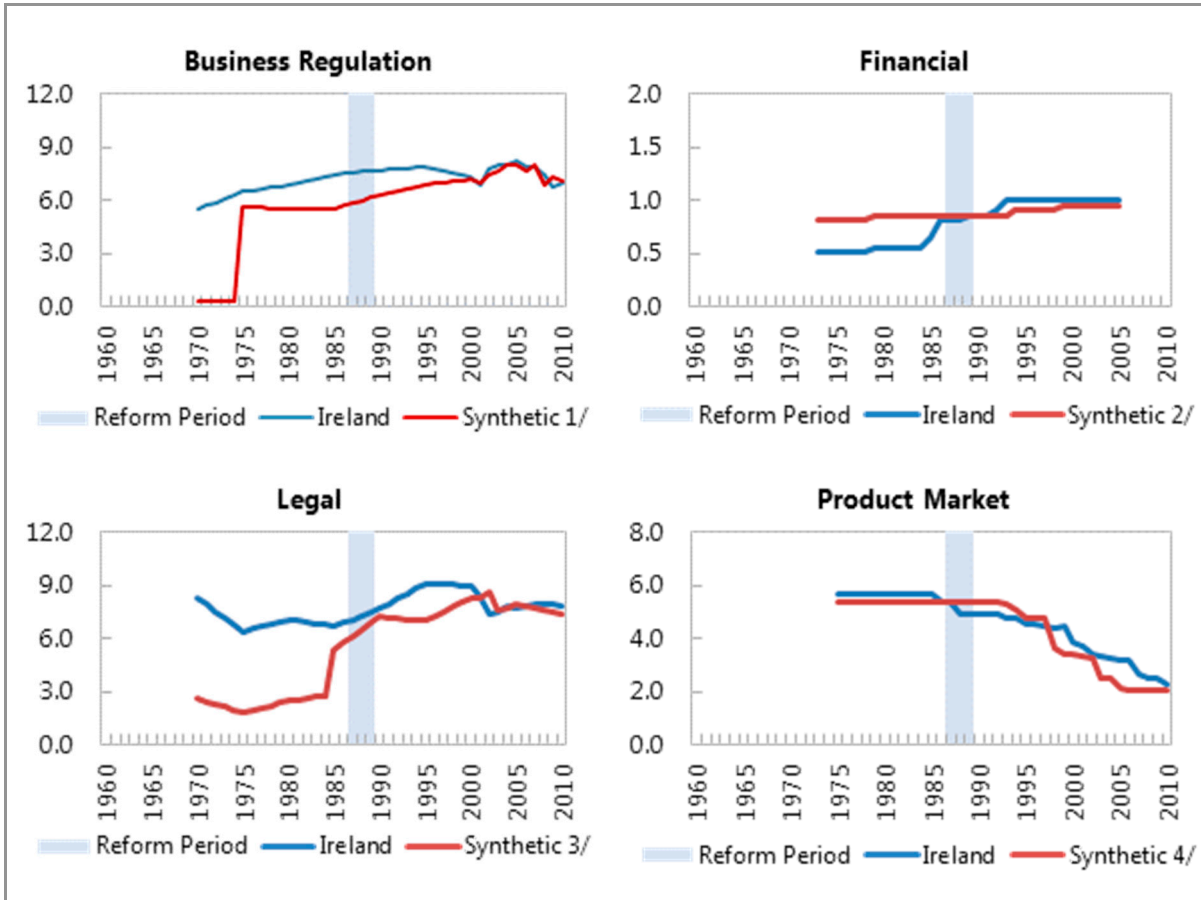
Figure AVI-6. Germany, 2000: Non-Fiscal Structural Reform (Index)



Source: EPW, OECD and author's calculations.

¹ France and United States. ² France, Japan, Switzerland, United States, Singapore, Dominican Rep., Thailand, Colombia, Costa Rica, Hong Kong, Jamaica, Korea, Malaysia, Uruguay, Albania, Bulgaria and Canada. ³ France, Japan and United States. ⁴ Switzerland, Japan, United States and Brazil. ⁵ Switzerland, Canada, and Korea.

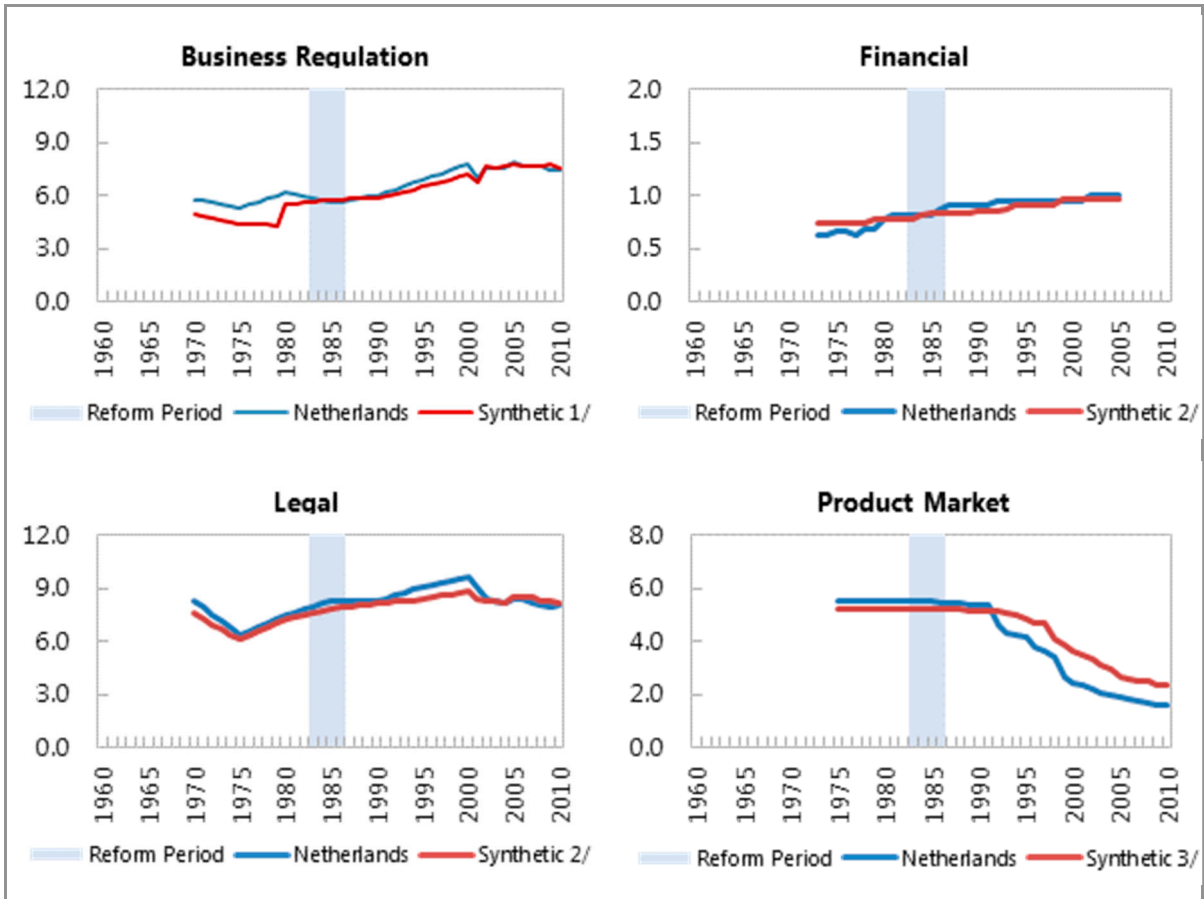
Figure AVI-7. Ireland, 1987: Non-Fiscal Structural Reform (Index)



Source: EPW, OECD and author's calculations.

¹Iceland, Cyprus and France. ²Switzerland. ³Cyprus, Iceland and France. ⁴Iceland and France.

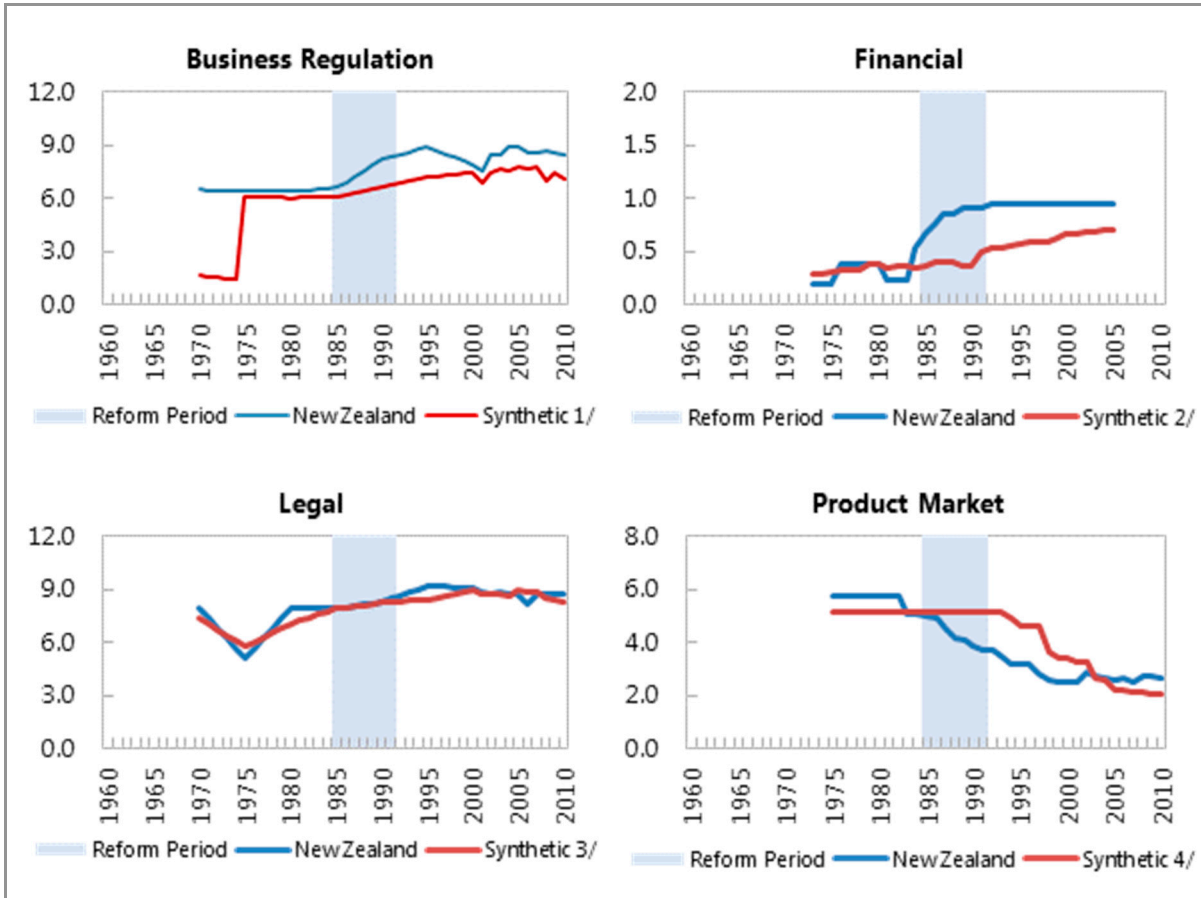
Figure AVI-8. Netherlands, 1983: Non-Fiscal Structural Reform (Index)



Source: EPW, OECD and author's calculations.

¹Switzerland, France, Poland and Malta. ²Switzerland and France. ³Switzerland, Poland and France.

Figure AVI-9. New Zealand, 1986: Non-Fiscal Structural Reform (Index)



Source: EPW, OECD and author's calculations.

¹Iceland, Costa Rica, Switzerland and Korea. ²Dominican Rep., Costa Rica, Switzerland and Uruguay. ³Iceland, Switzerland and Korea. ⁴Iceland, Switzerland and Japan.

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